

Health Care Financing

Research Report

End Stage Renal Disease, 1991



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Department of Health and Human Services
Health Care Financing Administration
Bureau of Data Management and Strategy

Health Care Financing

Research Report

The Health Care Financing Administration (HCFA) was established to combine health care financing and quality assurance within a single agency. HCFA is responsible for the Medicare program, Federal participation in the Medicaid program, and a variety of other health care quality assurance programs.

The mission of HCFA is to promote the timely delivery of appropriate, quality health care to the beneficiaries of its programs—approximately 59 million of the Nation's aged, disabled, and poor. The agency must also ensure that program beneficiaries are aware of the services for which they are eligible, that those services are accessible and of high quality, and that agency policies and actions promote efficiency and quality within the total health care delivery system.

The Bureau of Data Management and Strategy (BDMS) operates HCFA's statistical data systems and maintains the national Medicare statistical files. BDMS also serves as the focal point within the agency for information systems policy, planning, and data standards development.

The Office of Research and Demonstrations (ORD) conducts studies and projects that demonstrate and evaluate optional reimbursement, coverage, eligibility, and management alternatives to the present Federal programs. In addition, ORD examines the impact of HCFA programs on health care status, utilization, and expenditures, as well as their effect on beneficiary access to services, health care providers, and the health care industry.

Health Care Financing Research Reports present the results of major studies and projects conducted by HCFA program staff. These reports contain significant findings that affect HCFA programs and are used as the basis for making program changes.

The *End Stage Renal Disease Research Report, 1991* reflects a wide range of data and analyses regarding the Medicare end stage renal disease program. This report emphasizes trends and comparisons over time, making it a standard reference source for illustrating changes in the nature of the Medicare end stage renal disease population and for examining the pattern of treatment for these patients.

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Office of Research and Demonstrations
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End stage renal disease, 1991

Introduction

With the enactment of section 299I of Public Law 92-603 (1972 Amendments to the Social Security Act), full Medicare coverage was extended to persons with end stage renal disease (ESRD), effective July 1, 1973. To be eligible for Medicare benefits, the patient must first be currently or fully insured, or be eligible for Social Security benefits, or be the spouse or dependent child of such a person. Additionally, a physician must certify that the individual requires chronic dialysis or a kidney transplant to maintain life.

The Medicare program pays a prospectively determined amount for kidney transplants, for certain drug treatments, and a composite rate schedule for dialysis services. For example, immunosuppressive drugs prescribed for transplant recipients are covered by Medicare for 1 year following discharge from the hospitalization for the transplant. The drug, erythropoietin (EPO), used to combat anemia, was added to Medicare coverage effective June 1, 1989.

The Health Care Financing Administration (HCFA) is charged with the effective administration of Medicare benefits to eligible persons with ESRD. Integral to the effective management of the ESRD program is the operation of a comprehensive data base covering medical and demographic information for the Medicare ESRD population. This data base, along with other ESRD program-related data, is contained within the ESRD Program Management and Medical Information System (PMMIS). This system, as required by Public Law 95-292, section (c)(1)(A), is designed to serve the needs of the Department of Health and Human Services in support of program analysis, policy development, and epidemiological research. The ESRD PMMIS includes information on both Medicare ESRD beneficiaries and Medicare-approved ESRD hospitals and dialysis facilities.

The principal sources of beneficiary-specific information are the Medicare billing records and incidence-specific medical information forms that report onset of ESRD, characteristics and status of a kidney transplant, and cause of death for an ESRD beneficiary. The principal sources of hospital and facility information are the Medicare certification approval notices and an annual survey of these organizations.

Legislation passed in 1986 mandated the establishment of a national ESRD patient registry. This registry, the United States Renal Data System (USRDS), is operated by a Coordinating Center (CC). The CC is currently the Urban Institute under contract with the National Institutes of Health (NIH). The USRDS is managed through the cooperative efforts of HCFA and NIH. Further, there are two major advisory committees which are composed of representatives from Federal agencies and professionals from the renal community; these are the Executive Committee and the Scientific Advisory Committee. Also, the Department of Health and Human Services (DHHS) has established the ESRD Data Advisory Committee to provide advice to the Secretary of DHHS in the formulation of policies and procedures relevant to the management, collection, and analyses of ESRD data.

The ESRD PMMIS maintained by HCFA provides the foundation data for the USRDS. However, the ESRD networks, under contract to HCFA, collect and provide additional data to the USRDS CC for the conduct of focused studies on the causes, progression, and treatment of ESRD. The CC disseminates a variety of reports based on these studies.

HCFA recognizes the need to disseminate the information developed from the ESRD PMMIS data and any resulting analyses of these data as promptly as possible. The purpose of this report is to present, in a single volume, statistics concerning recent trends in ESRD treatment and detailed discussions of selected health issues involving the ESRD population. Several of the tables in this report emphasize trends and comparisons over time, making this report a standard reference on the Medicare ESRD population and on ESRD treatment patterns.

Data which have been released to HCFA from other organizations (e.g., the Department of Veterans Affairs, the Centers for Disease Control, the European Dialysis and Transplantation Association, the Australia and New Zealand Dialysis and Transplant Registry, and the Canadian Renal Failure Register) have been included and identified where appropriate.

Incidence and enrollment

Program incidence

Trends in Medicare ESRD program incidence (that is, the count of new enrollees), from 1985 to 1990 are described in this section. The new Medicare ESRD population is presented by age, sex, race, primary diagnosis for renal failure, and State in the accompanying tables, along with some comparative data gathered from other Western countries on their ESRD populations.

The total counts of new Medicare ESRD beneficiaries by age, sex, race, and primary diagnosis are shown in Table 1. In 1985, 29,718 persons were added to the Medicare enrollment files as ESRD beneficiaries. By 1990, the annual number of new ESRD beneficiaries had increased to 45,871, representing an average annual increase of 9.1 percent. The increase from 1989 to 1990 was 8.2 percent, almost one percentage point lower than the 5-year average.

Older persons, in particular those over 65 years of age, comprised the largest and fastest growing age group of ESRD beneficiaries with the 65-74 years of age group comprising 27.1 percent of new enrollees in 1990. The largest average annual rate of growth was for persons 75 years of age or over (15.9 percent). The under 15 years of age group experienced the largest percentage increase from 1989 to 1990 (13.4 percent). There was a decrease from 1989 to 1990 of 4.7 percent in cases for persons in the 15-24 years of age group. However, incidence has remained fairly constant for both of these age groups during the 1985 to 1990 time period.

The average annual rate of increase was nearly the same for females (9.0 percent) as for males (9.1 percent). The percentage of the total of new enrollees for women has remained constant in each of the years, 1987 through 1989 (45.6 percent). The percent change from 1989 to 1990 was slightly higher for males (8.6 percent) than for females (7.8 percent).

Black and white persons, together, made up 94.9 percent of new enrollees in 1990. However, the average annual rates of growth were higher for both American Indians (15.2 percent) and for Asian persons (13.6 percent) than for either white persons (8.6 percent) or black persons (9.0 percent). The highest average annual rate of growth was in the other/unknown race category (25.0 percent); however, this remains a very small percentage of the total new enrollees (1.8 percent).

In terms of diagnoses, the average annual rate of growth was highest for those persons whose renal failure was attributed to diabetes (13.5 percent) and second highest for those whose renal failure was attributed to hypertension (11.4 percent). The percent change from 1989 to 1990 was lower than the average annual percent change in all diagnoses categories, except for polycystic kidney disease. Diabetics and hypertensives represented the largest proportion of 1990 new enrollees—together representing 62.4 percent of total program additions.

The “not reported” category appearing in this table, and all subsequent tables displaying primary diagnosis information, represents those patients who were added to

the Program Management and Medical Information System file via the Health Insurance Master File. Primary diagnosis information is not available from the Health Insurance Master File, but only from the Chronic Renal Disease Medical Evidence Report, HCFA-2728, which was not submitted for those patients appearing in the “not reported” category.

Medicare ESRD program incidence expressed in terms of rates per million population is shown in Table 2. From 1985 to 1990, program incidence increased from 125 enrollees per million persons to 184 enrollees per million persons, representing an average annual rate of increase of 8.1 percent. Incidence rates are strongly related to age. In 1990, these rates ranged from 9 enrollees per million persons in the under 15 years of age group to 686 enrollees per million persons in the 65 to 74 years of age group. Males had a higher incidence rate (207 enrollees per million) than did females (163 enrollees per million). Black persons had the highest incidence rate (430 enrollees per million), followed by American Indians (281 enrollees per million), white persons (153 enrollees per million), and Asian persons (133 enrollees per million). In terms of diagnoses, diabetics and hypertensives comprised the highest incidence rates of 63 and 52 enrollees per million population, respectively.

Medicare ESRD program incidence per million population is shown by State in Table 3. The overall trend of increasing rates of incidence is reflected in this table for individual States. Of the 50 States and the District of Columbia, all had higher program incidence rates in 1990 than in 1985. In 1985, only the District of Columbia had an incidence rate greater than 200 enrollees per million persons. In contrast, 12 States, including the District of Columbia, had incidence rates greater than 200 enrollees per million persons in 1990. Only Alaska and Wyoming had an incidence rate below 100 in 1990.

Variations by State in Medicare ESRD average program incidence for the years 1985 through 1990 are illustrated again in Table 4, with adjustments for age, sex, and race. State incidence rates per million are averaged across the 6 years from 1985 to 1990 to make the estimates more stable. Also, the States are ranked from highest to lowest incidence rates. Information on the unadjusted rates is shown in the first two columns and rates as adjusted for age, sex, and race are shown in the last two columns (adjusted with the indirect method). During this period (1985 to 1990), the U.S. average unadjusted incidence rate was 150 enrollees per million (calculated from Table 3). The individual State average unadjusted rates ranged from a high of 346 enrollees per million in the District of Columbia to a low of 62 enrollees per million in Alaska. It also narrowed the range of incidence rates per million population. After adjustment, the individual rates ranged from a high of 186 enrollees per million in the District of Columbia to a low of 80 enrollees per million in Alaska. The District of Columbia, where black persons comprise 65.8 percent of the total population, had an adjusted incidence rate of 186 enrollees per million, which

is 46.2 percent lower than its unadjusted rate. Conversely, Utah, where the black population is 0.7 percent of the total, had an adjusted rate of 133 enrollees per million, which is 46.2 percent higher than its unadjusted rate of 91 enrollees per million.

Incidence rates per million population for the years from 1985 to 1990, for a number of countries that have ESRD registries, including the U.S., are presented in Table 5. These rates represent not only a difference in underlying renal failure but in the medical and economic environments in the various countries as well. In 1990, the incidence rates per million persons for countries other than the United States ranged from the low of 19 per million in Poland to the high of 115 per million in Israel.

Most of the countries shown in Table 5 experienced increases in the incidence of treated renal disease between 1985 and 1990. Seven of the countries experienced growth rates in excess of 10 percent per year. Only one country, Ireland, experienced a decrease in incidence (2.5 percent). Due to the high incidence rate among black persons, the total United States incidence rate is not comparable to European countries, which have much smaller black populations. However, in 1990, even the incidence rate among white persons in the United States was much higher than those of European countries. The white incidence rate of 153 per million population in the United States was 33 percent greater than the incidence rate of any of the other countries listed in Table 5.

Tables 6 and 7 show the distribution of patients by treatment category at 30 days after renal failure (Table 6) and at 1 year following renal failure (Table 7). Patients who select a home dialysis modality are required to fill out the home dialysis selection form (HCFA-382). The data from this form were used to determine whether or not the patient was dialyzing at home. If the patient received a transplant within the time frame, either 30 days or 1 year, and had not experienced a graft failure, then the patient was included in the transplant category. If the patient had not selected a home dialysis modality and did not have a functioning kidney graft and had not died, then the patient was assumed to be on in-facility dialysis.

Between 1986 and 1990, there were 188,352 persons who experienced renal failure and were Medicare entitled. By the end of the first month (Table 6) of renal failure (or Medicare entitlement) 84 percent of patients were receiving in-facility dialysis (see Outpatient). The second most common modality was continuous ambulatory peritoneal dialysis (CAPD) at 10 percent. Only 2 percent of patients had a functioning kidney transplant by the end of 30 days, and 2 percent of the patients had died.

Modality selection was significantly related to age at the time of renal failure. Fifty-six percent of pediatric patients (ages less than 15) were on in-facility dialysis after 1 month. In all other age groups, 74 percent or more of the patients were on in-facility dialysis after 1 month. Sixteen percent of pediatric patients had a functioning graft by that time; while 10 percent or fewer of the patients in the other age groups had functioning graft at 30 days. The percentage of patients in the under 15 years of age group who were on Continuous Cycling Peritoneal Dialysis (CCPD) (15 percent) was at least five times greater than the use of CCPD in any of the other age

groups, which ranged from 3 percent in the 15-24 years of age group to 1 percent in patients 55 years of age and over. The use of CAPD was somewhat more consistent across age groups, ranging from a low of 6 percent in the 75 years of age and over group to 13 percent in the 25-34 and 35-44 years of age groups. These data show that CCPD was not frequently used by any age group other than the pediatric patients. Also, transplantation as the initial modality decreased rapidly with age, accounting for less than 1 percent of all patients over age 65. There were no significant differences in initial modality by sex.

American Indians and whites had lower rates of in-facility dialysis (83 percent and 81 percent, respectively) than did Asians and blacks (both at 90 percent). The differences were accounted for by higher rates of CAPD by American Indians and whites.

There were no large differences in initial modality by cause of renal failure. However, patients whose renal failure was attributed to polycystic kidney disease were most likely to receive a transplant (5 percent) and those with hypertension were least likely to receive a transplant (less than 1 percent).

Patient status at the end of 1 year following renal failure (or date of Medicare entitlement) is shown in Table 7. Most of the changes in the distribution of patients were due to transplantation or death. By the end of 1 year, death had decreased the initial cohort by 23 percent. Fifty-five percent of the initial cohort remained on in-facility dialysis by the end of 1 year. CAPD remained constant at 10 percent of the initial cohort, while persons with a functioning graft increased to 8 percent.

The effect of mortality was very pronounced by age. Five percent of the pediatric population (under 15 years of age) and 4 percent of young adult population (15-24 years of age) died, while 31 percent of persons 65 to 74 and 43 percent of persons ages 75 and over died during the first year of ESRD. Only one-fourth (25 percent) of pediatric patients remained on in-facility dialysis by the end of one year. Almost one-half (45 percent) had a functioning graft with most of the remaining pediatric patients on CAPD (9 percent) or CCPD (13 percent). For other age groups, the percent of patients on in-facility dialysis ranged from 44 percent for persons ages 15 to 24, to 61 percent for persons ages 55 to 64. Transplantation decreased rapidly with age. Only 3 percent of persons ages 55 to 64, and less than 1 percent of persons 65 years of age and over, had a functioning graft after 1 year.

Other demographic differences in mortality, use of CAPD, and transplantation also became more evident by 1 year following renal failure. A higher percentage of males than females had functioning kidney grafts at 1 year (9 percent and 7 percent, respectively). Asians (10 percent), whites (10 percent) and American Indians (7 percent) were most likely to have a functioning graft at one year, while only 4 percent of blacks had a successful kidney transplant. Whites had the highest mortality rate at 26 percent with other racial groups in the 15 to 17 percent range. American Indians (12 percent) and whites (11 percent) were most likely to use CAPD. The rate of home hemodialysis among American Indians (4 percent) was twice as high as any other racial group.

Table 1

Medicare end stage renal disease program incidence, by age, sex, race, and primary diagnosis: 1985-90

Age, sex, race, and primary diagnosis	1985	1986	1987	1988	1989	1990	Percent 1990	Average annual percent change	Percent change 1989-90
Number of new enrollees									
Total	29,718	31,935	34,848	37,824	42,382	45,871	100.0	9.1	8.2
Age									
Under 15 years	415	422	429	400	402	456	1.0	1.9	13.4
15-24 years	1,183	1,183	1,234	1,256	1,303	1,242	2.7	1.0	-4.7
25-34 years	2,717	2,985	2,845	3,074	3,379	3,395	7.4	4.6	0.5
35-44 years	3,395	3,657	3,979	4,321	4,685	5,082	11.1	8.4	8.5
45-54 years	4,245	4,438	4,880	5,367	5,874	6,155	13.4	7.7	4.8
55-64 years	6,967	7,191	7,832	8,375	8,995	9,645	21.0	6.7	7.2
65-74 years	7,228	7,883	8,882	9,569	11,103	12,421	27.1	11.4	11.9
75 years or over	3,568	4,176	4,767	5,462	6,641	7,475	16.3	15.9	12.6
Sex									
Male	16,205	17,547	18,969	20,585	23,062	25,036	54.6	9.1	8.6
Female	13,513	14,388	15,879	17,239	19,320	20,835	45.4	9.0	7.8
Race									
Asian	512	514	569	673	789	970	2.1	13.6	22.9
Black	8,397	8,847	9,846	10,718	12,123	12,894	28.1	9.0	6.4
White	20,273	21,804	23,559	25,359	28,347	30,648	66.8	8.6	8.1
American Indian	271	339	348	463	526	550	1.2	15.2	4.6
Other/unknown	265	431	526	611	597	809	1.8	25.0	35.5
Primary diagnosis									
Diabetes	8,282	9,404	10,417	11,605	14,024	15,634	34.1	13.5	11.5
Glomerulonephritis	4,589	4,720	4,949	5,193	5,589	5,677	12.4	4.3	1.6
Hypertension	7,570	8,004	9,136	10,217	11,973	12,988	28.3	11.4	8.5
Polycystic kidney disease	1,161	1,219	1,242	1,242	1,262	1,386	3.0	3.6	9.8
Interstitial nephritis	1,364	1,355	1,235	1,218	1,370	1,354	3.0	-0.1	-1.2
Obstructive nephropathy	832	843	833	869	943	894	1.9	1.4	-5.2
Other	1,863	1,869	2,007	2,162	2,563	2,733	6.0	8.0	6.6
Unknown	2,172	2,299	2,718	2,584	2,380	2,297	5.0	1.1	-3.5
Not reported	1,885	2,222	2,311	2,734	2,278	2,908	6.3	9.1	27.7

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Program Management and Medical Information System, April 1992 update, 1985-90.

Mortality and treatment patterns by diagnostic category largely reflected underlying age and racial distributions. Patients whose renal failure was attributed to obstructive nephropathy had the highest mortality rate at 28 percent, and a transplant rate of 6 percent. The experience of those with diabetes as their primary diagnosis was similar with a mortality rate of 25 percent and a transplantation rate of 7 percent. Patients whose renal failure was attributed to hypertension had the next highest mortality rate (27 percent) and also had the lowest transplant rate

(3 percent). These rates reflect the higher distribution and greater concentration of blacks in this diagnostic category who are less likely to receive a transplant, and an older age distribution, which increases the mortality rate. The high rate of transplantation (18 percent with a functioning graft) and the low mortality rate (8 percent) among persons whose renal failure was attributed to polycystic kidney disease is probably reflective of their youth and relatively better health status.

Table 2
Medicare end stage renal disease program incidence rates per million population,
by age, sex, race, and primary diagnosis: 1985-90

Age, sex, race, and primary diagnosis	1985	1986	1987	1988	1989	1990	Average annual percent change	Percent change 1989-90
Number of new enrollees per million population								
Total	125	133	144	155	172	184	8.1	7.3
Age								
Under 15 years	8	8	8	8	8	9	1.5	13.0
15-24 years	30	30	32	33	35	34	2.5	-3.2
25-34 years	68	73	69	73	79	79	3.0	-0.9
35-44 years	107	111	117	123	129	135	4.7	5.0
45-54 years	177	183	199	217	235	244	6.7	3.8
55-64 years	325	337	367	394	424	456	7.0	7.5
65-74 years	429	461	512	544	622	686	9.8	10.3
75 years or over	309	352	391	437	518	569	13.0	9.8
Sex								
Male	140	150	161	173	192	207	8.1	7.6
Female	111	117	128	138	153	163	8.1	6.9
Race								
Asian	95	89	93	103	114	133	7.0	16.6
Black	297	309	340	366	409	430	7.7	5.1
White	104	112	120	128	143	153	8.0	7.5
American Indian	160	194	194	250	276	281	11.8	1.7
Other/unknown	—	—	—	—	—	—	—	—
Primary diagnosis								
Diabetes	35	39	43	48	57	63	12.5	10.5
Glomerulonephritis	19	20	20	21	23	23	3.4	0.7
Hypertension	32	33	38	42	49	52	10.4	7.5
Polycystic kidney disease	5	5	5	5	5	6	2.7	8.8
Interstitial nephritis	6	6	5	5	6	5	-1.1	-2.0
Obstructive nephropathy	4	4	3	4	4	4	0.5	-6.0
Other	8	8	8	9	10	11	7.0	5.7
Unknown	9	10	11	11	10	9	0.2	-4.3
Not Reported	8	9	10	11	9	12	8.1	26.5

NOTE: Average annual percent change calculated by use of compounding.

SOURCES: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Program Management and Medical Information System, April 1992 update, 1985-90; and U.S. Department of Commerce, Bureau of the Census: Population Estimates and Projections. *Current Population Reports*. Series P-25, No. 998. Washington. U.S. Government Printing Office.

Table 3

Medicare end stage renal disease program incidence rates per million population, by State: 1985-90

State	1985	1986	1987	1988	1989	1990
Number of new enrollees per million population						
United States	123	131	142	152	169	182
Alabama	139	144	165	188	211	207
Alaska	29	75	53	65	77	69
Arizona	130	144	149	158	176	173
Arkansas	112	117	150	160	158	169
California	123	136	142	143	163	174
Colorado	79	102	98	102	124	116
Connecticut	149	137	151	145	166	173
Delaware	146	137	163	186	202	203
District of Columbia	323	278	320	295	411	453
Florida	151	169	185	189	202	211
Georgia	133	153	168	174	202	206
Hawaii	174	165	195	196	193	242
Idaho	83	87	83	97	124	139
Illinois	129	140	150	153	173	190
Indiana	108	108	128	149	149	168
Iowa	95	111	99	115	131	145
Kansas	93	102	110	120	147	151
Kentucky	103	109	120	129	137	158
Louisiana	143	166	181	199	230	240
Maine	83	86	98	90	87	111
Maryland	130	128	158	160	184	214
Massachusetts	99	106	107	117	138	141
Michigan	115	125	132	151	176	182
Minnesota	96	98	118	117	125	138
Mississippi	137	147	160	183	197	211
Missouri	118	129	147	150	169	186
Montana	83	88	101	89	135	140
Nebraska	95	93	107	122	134	139
Nevada	118	145	126	143	146	131
New Hampshire	81	77	102	101	118	118
New Jersey	153	164	170	180	198	221
New Mexico	111	116	120	162	152	162
New York	121	133	136	153	166	184
North Carolina	142	138	158	166	192	198
North Dakota	77	107	96	111	156	157
Ohio	115	123	133	154	161	177
Oklahoma	99	114	121	147	153	181
Oregon	96	107	112	122	138	140
Pennsylvania	139	146	148	165	176	206
Rhode Island	129	102	119	136	157	180
South Carolina	166	169	177	194	228	239
South Dakota	98	95	137	131	122	125
Tennessee	115	123	147	146	185	192
Texas	125	133	146	163	178	193
Utah	72	83	83	104	101	102
Vermont	76	65	93	91	106	116
Virginia	167	126	147	155	169	182
Washington	88	95	99	104	128	136
West Virginia	109	122	131	161	153	165
Wisconsin	91	103	123	135	152	151
Wyoming	76	59	76	105	97	77

SOURCES: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Program Management and Medical Information System, April 1992 update, 1985-90; and U.S. Department of Commerce, Bureau of the Census: Population Estimates and Projections. *Current Population Reports*. Series P-25, No. 998. Washington. U.S. Government Printing Office.

Table 4
Average Medicare end stage renal disease program incidence rates
per million population, by State: 1985-90

State	Unadjusted		Age, sex, race, adjusted	
	Rate	Rank	Rate	Rank
Number of new enrollees per million population				
Alabama	176	7	155	12
Alaska	62	51	80	51
Arizona	156	17	160	9
Arkansas	144	24	135	32
California	147	22	141	28
Colorado	104	44	123	44
Connecticut	154	18	159	11
Delaware	173	9	171	5
District of Columbia	346	1	186	1
Florida	186	5	160	8
Georgia	173	8	166	6
Hawaii	195	3	112	48
Idaho	102	45	126	42
Illinois	156	16	152	16
Indiana	135	30	150	21
Iowa	116	39	130	39
Kansas	121	34	130	37
Kentucky	126	33	140	29
Louisiana	193	4	175	4
Maine	93	47	110	49
Maryland	163	13	149	22
Massachusetts	118	36	128	41
Michigan	147	23	152	15
Minnesota	115	40	138	30
Mississippi	173	10	145	24
Missouri	150	20	152	17
Montana	106	43	120	46
Nebraska	115	41	129	40
Nevada	135	31	143	25
New Hampshire	100	46	125	43
New Jersey	181	6	179	2
New Mexico	138	27	142	27
New York	149	21	134	34
North Carolina	166	11	153	14
North Dakota	117	38	135	31
Ohio	144	25	150	19
Oklahoma	136	29	134	33
Oregon	119	35	132	36
Pennsylvania	163	12	160	10
Rhode Island	137	28	147	23
South Carolina	196	2	176	3
South Dakota	118	37	130	38
Tennessee	152	19	150	20
Texas	157	15	163	7
Utah	91	49	133	35
Vermont	91	48	115	47
Virginia	158	14	154	13
Washington	109	42	122	45
West Virginia	140	26	151	18
Wisconsin	126	32	143	26
Wyoming	82	50	104	50

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Program Management and Medical Information System, April 1992 update, 1990.

Table 5

New end stage renal disease patients per million population, for selected countries: 1985-90

Country	1985	1986	1987	1988	1989	1990	Average annual percent increase	Percent change 1989-90
Number of patients per million								
Total EDTA	34	37	41	42	45	44	5.2	-2.0
Austria	57	70	77	96	89	101	12.1	14.1
Belgium	62	74	76	85	77	97	9.3	25.3
Bulgaria	33	33	38	30	38	40	4.1	5.2
Czechoslovakia	23	27	29	33	39	46	15.0	19.9
Denmark	43	56	48	53	54	52	3.8	-3.2
Federal Republic of Germany	59	66	85	77	84	79	6.1	-5.3
Finland	45	41	47	49	47	49	1.8	4.7
France	43	44	58	56	70	57	5.6	-19.1
German Democratic Republic	32	35	38	43	42	61	13.8	46.6
Greece	58	54	58	59	53	75	5.4	42.3
Hungary	19	16	21	24	28	42	17.0	48.6
Iceland	0	37	57	29	16	60	—	271.9
Ireland	48	33	36	34	29	42	-2.5	45.2
Israel	59	58	70	80	67	115	14.2	70.9
Italy	47	49	49	55	54	50	1.2	-7.9
Luxembourg	52	85	66	87	32	71	6.3	117.6
Netherlands	49	48	44	65	56	69	6.9	22.8
Norway	36	59	43	53	51	67	13.3	31.8
Poland	10	13	16	15	20	19	14.1	-2.0
Portugal	49	50	49	43	49	75	8.8	52.8
Spain	45	51	50	57	56	60	5.9	6.6
Sweden	62	60	56	64	50	66	1.4	31.5
Switzerland	59	65	62	62	66	77	5.4	16.7
United Kingdom	43	47	51	55	32	61	7.1	90.9
Yugoslavia	32	36	39	43	47	44	6.8	-6.3
Australia	39	44	48	46	51	55	7.1	7.8
New Zealand	37	43	44	43	48	51	6.6	6.3
Canada	62	68	71	75	78	82	5.8	5.4
United States ¹	125	133	144	155	172	184	8.1	7.3
Asian	95	89	93	103	114	133	7.0	16.6
Black	297	309	340	366	409	430	7.7	5.1
White	104	112	120	128	143	153	8.0	7.5
American Indian	160	194	194	250	276	281	11.8	1.7

¹Includes only Medicare entitled end stage renal disease (ESRD) patients. Of all ESRD patients in the United States, it is estimated that 7 to 10 percent are not Medicare eligible.

SOURCES: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Program Management and Medical Information System, April 1992 update, 1985-90; European Dialysis and Transplant Association (EDTA) Combined Report on Regular Dialysis and Transplantation in Europe, 1985-90; Canadian Renal Failure Register, 1990; The Fourteenth Annual Report on the Australia and New Zealand Dialysis and Transplant Registry, 1990.

Table 6
Medicare end stage renal disease program incidence modality, by age, sex, race,
and primary diagnosis, patients' status at 30 days: 1986-90

Age, sex, race, and primary diagnosis	Total patients	Percent total	Outpatient	Home Hemodialysis	CAPD ¹	CCPD ²	Other	Transplant	Death
Percent of Patients									
Total	188,352	100	84	1	10	1	*	2	2
Age									
Under 15 years	2,029	100	56	*	11	15	2	16	*
15-24 years	5,973	100	74	1	11	3	*	10	*
25-34 years	15,073	100	76	1	13	2	1	7	1
35-44 years	20,839	100	78	1	13	2	*	5	1
45-54 years	25,635	100	83	1	11	2	*	2	1
55-64 years	40,483	100	86	1	10	1	*	1	2
65-74 years	49,808	100	87	1	8	1	*	*	3
75 years or over	28,512	100	88	1	6	1	*	*	4
Sex									
Male	102,709	100	84	1	9	1	*	2	2
Female	85,643	100	84	1	10	1	*	2	2
Race									
Asian	3,398	100	90	*	5	1	*	2	1
Black	52,871	100	90	1	6	1	*	1	1
White	127,103	100	81	1	11	2	*	3	2
American Indian	2,161	100	83	3	11	1	*	1	1
Other/unknown	2,819	100	90	*	6	1	*	1	2
Primary diagnosis									
Diabetes	59,592	100	83	1	11	2	*	2	2
Glomerulonephritis	25,504	100	80	1	12	2	*	3	1
Hypertension	51,336	100	87	1	8	1	*	*	2
Polycystic kidney disease	6,175	100	79	1	12	2	*	5	*
Interstitial nephritis	6,417	100	83	1	10	1	*	2	1
Obstructive nephropathy	4,311	100	88	1	6	1	*	2	2
Other	11,005	100	82	1	9	2	1	3	2
Unknown	12,067	100	85	1	8	1	*	2	3
Not reported	11,945	100	81	1	7	1	*	7	3

¹Continuous ambulatory peritoneal dialysis

²Continuous cycling peritoneal dialysis.

* Less than 1 percent.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Program Management and Medical Information System, April 1992 update.

Table 7
Medicare end stage renal disease program Incidence, modality, by age, sex, race,
and primary diagnosis, patients' status at 1 year: 1986-90

Age, sex, race, and primary diagnosis	Total patients	Percent total	Outpatient	Home Hemodialysis	CAPD ¹	CCPD ²	Other	Transplant	Death
Percent of Percent total									
Total	188,352	100	55	1	10	1	*	8	23
Age									
Under 15 years	2,029	100	25	*	9	13	2	45	5
15-24 years	5,973	100	44	1	12	3	*	35	4
25-34 years	15,073	100	46	1	14	2	1	27	9
35-44 years	20,839	100	52	2	14	2	1	19	10
45-54 years	25,635	100	59	2	13	2	*	10	13
55-64 years	40,483	100	61	1	11	1	*	3	21
65-74 years	49,808	100	58	2	8	1	*	*	31
75 years or over	28,512	100	50	1	5	1	*	*	43
Sex									
Male	102,709	100	54	2	10	1	*	9	23
Female	85,643	100	57	1	10	1	*	7	23
Race									
Asian	3,398	100	66	1	7	1	*	10	15
Black	52,871	100	68	1	8	1	*	4	17
White	127,103	100	49	2	11	2	*	10	26
American Indian	2,161	100	59	4	12	1	*	7	16
Other/unknown	2,819	100	69	1	7	2	*	3	18
Primary diagnosis									
Diabetes	59,592	100	55	1	11	1	*	7	25
Glomerulonephritis	25,504	100	52	2	13	2	*	15	15
Hypertension	51,336	100	59	1	8	1	*	3	27
Polycystic kidney disease	6,175	100	55	3	14	2	*	18	8
Interstitial nephritis	6,417	100	56	2	11	1	*	10	19
Obstructive nephropathy	4,311	100	57	1	6	1	*	6	28
Other	11,005	100	47	2	11	2	1	11	27
Unknown	12,067	100	54	1	10	1	*	8	25
Not reported	11,945	100	55	1	9	1	*	15	19

¹Continuous ambulatory peritoneal dialysis

²Continuous cycling peritoneal dialysis.

* Less than 1 percent.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Program Management and Medical Information System, April 1992 update.

Program enrollment

Trends in Medicare ESRD program total enrollment for the years 1985 to 1990 are described in this section. Tables are presented that show Medicare ESRD enrollment by age, sex, race, and primary diagnosis. Enrollment is broken into two groups of persons: those on dialysis and those with a functioning graft. Enrollment counts are taken as of December 31 each year and reflect the patients' dialysis or transplant status as of that date.¹ Medicare enrollment by dialysis and functioning graft patient groups for the years 1978 to 1990 is presented in Table 8. During this time, enrollment grew from 44,083 to 164,642, an average annual rate of increase of 11.6 percent. The number of patients on dialysis grew at a slightly slower rate of 10.4 percent per year (from 39,262 in 1978 to 128,546 in 1990). The number of patients with a functioning kidney graft increased at a faster annual rate of 18.3 percent (from 4,821 in 1978 to 36,096 in 1990). The rapid growth in patients with a functioning graft was due, in part, to increases in the number of transplants performed and, in part, to increased graft survival rates. As a result of these transplantation trends, patients with a functioning graft increased from 10.9 percent of the total Medicare ESRD population in 1978 to 21.9 percent in 1990. However, the increase in the functioning graft population from 1989 to 1990 was only 11.7 percent, reflecting the leveling of the number of transplants in the most recent years.

The Medicare dialysis patient population by age, sex, race, and primary diagnosis for the years 1985 to 1990 is shown in Table 9. The growth rate in the dialysis patient population has been greatest for persons 75 years of age or over, primarily as a result of the increase in program incidence rates shown in Tables 1 and 2. In 1985, persons 75 years of age or over accounted for 10.1 percent of the total dialysis patient population, increasing to 14.1 percent in 1990. The largest populations in absolute numbers were those in the two age groups between 55 and 74 years of age. Together these two groups accounted for 47.7 percent of the total dialysis patient population. In 1990, 52.5 percent of the Medicare dialysis population were male and 59.9 percent were white persons. The major diagnoses reported as primary causes of renal failure were hypertension (26.5 percent), diabetes (25.7 percent), and glomerulonephritis (15.6 percent).

Medicare dialysis patient population expressed as enrollment per million population is shown in Table 10. Overall, dialysis patient enrollment increased from 365 per

million population in 1985 to 517 per million in 1990—an average annual increase of 7.2 percent. Dialysis enrollment rates varied markedly with age, ranging (in 1990) from 14 per million for persons under 15 years of age to 1,851 per million for persons 65 to 74 years of age. Males had an enrollment rate per million that was 16.3 percent greater than that of females (557 per million and 479 per million, respectively). Dialysis patient enrollment for black persons was almost four times as great as for white persons (1,496 per million and 386 per million, respectively). Dialysis patient enrollment per million was lowest for Asians (326 per million) while Native Americans had a rate nearly twice that of whites (762 per million).

The Medicare ESRD population with a functioning graft is presented in Table 11 by age, sex, race, and primary diagnosis for the years 1985 to 1990. The same population in terms of rates per million population is shown in Table 12. In contrast to the dialysis population, those patients with functioning grafts come largely from the younger age groups. Table 11 shows that, of patients with functioning grafts in 1985 and 1990, 88.1 percent and 80.4 percent, respectively, were under 55 years of age. The percent increase from 1985 to 1990 was greater for each of the three older age groups than for any of the other age groups. Taken together, the 55 years of age or older group increased at an annual rate of 26.3 percent from 1985 to 1990; the under 55 years of age group increased by only 12.3 percent per year over the same period. In 1990, 61.6 percent of the Medicare ESRD population with a functioning kidney graft were male and 77.8 percent were white persons. The major diagnoses reported as the primary cause for renal failure were glomerulonephritis (26.8 percent) and diabetes (19.1 percent).

In terms of rates per million population (Table 12), the ESRD functioning graft population increased from 78 per million in 1985 to 145 per million in 1990—a 13.3 percent annual rate of increase. In 1990, those persons 35 to 44 years of age and 45 to 54 years of age had the highest rates per million population (275 per million and 313 per million, respectively). The rate was higher for males (183 per million) than for females (109 per million). The rate per million population was highest for black persons (216 per million) followed by Native Americans (189 per million), white persons (141 per million), and Asian persons (109 per million).

¹ Before 1984, there were problems of underreporting of kidney transplants and some people who have a functioning graft will be misclassified as on dialysis. Therefore, the data will tend to overestimate the number of persons on dialysis and underestimate the number of people with functioning grafts.

Table 8

Medicare end stage renal disease program enrollment, by dialysis and functioning graft: 1978-90

Year	Patients on dialysis		Patients with a functioning graft		All patients	
	Number	Percent	Number	Percent	Number	Percent
1978	39,262	89.1	4,821	10.9	44,083	100.0
1979	46,047	88.4	6,056	11.6	52,103	100.0
1980	52,687	87.9	7,270	12.1	59,957	100.0
1981	58,901	87.4	8,523	12.6	67,424	100.0
1982	65,918	86.4	10,366	13.6	76,284	100.0
1983	73,949	85.6	12,440	14.4	86,389	100.0
1984	80,433	84.1	15,245	15.9	95,678	100.0
1985	86,781	82.5	18,466	17.5	105,247	100.0
1986	92,791	80.4	22,597	19.6	115,388	100.0
1987	100,038	79.2	26,270	20.8	126,308	100.0
1988	107,783	78.7	29,240	21.3	137,023	100.0
1989	117,761	78.5	32,304	21.5	150,065	100.0
1990	128,546	78.1	36,096	21.9	164,642	100.0
Average annual percent increase	—	10.4	—	18.3	—	11.6
1989-90 percent increase	—	9.2%	—	11.7%	—	9.7%

NOTES: Enrollment is as of December 31 of each year and includes Medicare patients who are alive and currently entitled. Average annual percent increase calculated by use of compounding.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Program Management and Medical Information System, April 1992 update, 1978-90.

Table 9

Medicare end stage renal disease program enrollment for dialysis patients, by age, sex, race, and primary diagnosis: 1985-90

Age, sex, race, and primary diagnosis							Percent 1990	Average annual percent increase	Percent change 1989-90
	1985	1986	1987	1988	1989	1990			
	Number of patients								
Total	86,781	92,791	100,038	107,783	117,761	128,546	100.0	8.2	9.2
Age									
Under 15 years	637	658	674	676	677	759	0.6	3.6	12.1
15-24 years	2,755	2,698	2,758	2,861	3,023	3,102	2.4	2.4	2.6
25-34 years	7,724	7,960	8,200	8,681	9,284	9,771	7.6	4.8	5.2
35-44 years	10,981	11,700	12,479	13,460	14,779	16,163	12.6	8.0	9.4
45-54 years	13,992	14,485	15,217	16,415	18,074	19,359	15.1	6.7	7.1
55-64 years	21,111	21,956	23,253	24,445	25,783	27,796	21.6	5.7	7.8
65-74 years	20,816	23,095	25,434	27,538	30,316	33,514	26.1	10.0	10.5
75 years or over	8,765	10,239	12,023	13,707	15,825	18,082	14.1	15.6	14.3
Sex									
Male	46,202	48,950	52,440	56,354	61,625	67,482	52.5	7.9	9.5
Female	40,579	43,841	47,598	51,429	56,136	61,064	47.5	8.5	8.8
Race									
Asian	1,030	1,217	1,388	1,637	1,995	2,370	1.8	18.1	18.8
Black	28,584	31,057	34,033	37,032	40,834	44,853	34.9	9.4	9.8
White	54,403	57,595	61,465	65,580	71,083	76,995	59.9	7.2	8.3
American Indian	718	831	940	1,104	1,297	1,492	1.2	15.8	15.0
Other/unknown	2,046	2,091	2,212	2,430	2,552	2,836	2.2	6.7	11.1
Primary diagnosis									
Diabetes	15,478	18,056	20,850	23,891	28,363	33,011	25.7	16.4	16.4
Glomerulonephritis	14,994	15,927	16,891	17,756	18,959	20,024	15.6	6.0	5.6
Hypertension	19,593	21,989	24,641	27,174	30,641	34,100	26.5	11.7	11.3
Polycystic kidney disease	4,537	4,739	4,910	5,001	5,138	5,270	4.1	3.0	2.6
interstitial nephritis	3,716	4,051	4,155	4,301	4,493	4,685	3.6	4.7	4.3
Obstructive nephropathy	3,028	3,030	3,050	3,117	3,200	3,229	2.5	1.3	0.9
Other	3,792	4,314	4,845	5,298	6,055	6,759	5.3	12.3	11.6
Unknown	7,134	7,403	8,038	8,467	8,653	8,758	6.8	4.2	1.2
Not reported	14,509	13,282	12,658	12,778	12,259	12,710	9.9	-2.6	3.7

NOTES: All calculations are based on unrounded numbers. Average annual percent change calculated by use of compounding.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Program Management and Medical Information System, April 1992 update, 1985-90.

Table 10
Medicare end stage renal disease program dialysis enrollment per million population,
by age, sex, race, and primary diagnosis: 1985-90

Age, sex, race, and primary diagnosis	1985	1986	1987	1988	1989	1990	Average annual percent change	Percent change 1989-90
Number of enrollees per million								
Total	365	387	413	441	478	517	7.2	8.2
Age								
Under 15 years	12	12	13	13	13	14	3.1	11.6
15-24 years	70	69	72	75	81	84	3.9	4.2
25-34 years	192	195	198	207	218	226	3.3	3.8
35-44 years	347	357	367	382	406	430	4.4	5.9
45-54 years	583	597	621	664	724	768	5.7	6.1
55-64 years	985	1,027	1,091	1,150	1,216	1,314	5.9	8.1
65-74 years	1,236	1,351	1,466	1,565	1,698	1,851	8.4	9.0
75 years or over	759	863	987	1,096	1,235	1,377	12.7	11.5
Sex								
Male	400	419	445	474	513	557	6.9	8.5
Female	333	356	383	411	444	479	7.6	7.8
Race								
Asian	191	211	226	251	289	326	11.3	12.6
Black	1,012	1,086	1,176	1,264	1,378	1,496	8.1	8.6
White	280	295	313	332	358	386	6.6	7.7
American Indian	425	477	523	596	681	762	12.4	11.9
Other/unknown	—	—	—	—	—	—	—	—
Primary diagnosis								
Diabetes	65	75	86	98	115	133	15.3	15.4
Glomerulonephritis	63	66	70	73	77	81	5.0	4.7
Hypertension	82	92	102	111	124	137	10.7	10.3
Polycystic kidney disease	19	20	20	20	21	21	2.1	1.7
Interstitial nephritis	16	17	17	18	18	19	3.8	3.3
Obstructive nephropathy	13	13	13	13	13	13	0.4	0.0
Other	16	18	20	22	25	27	11.2	10.6
Unknown	30	31	33	35	35	35	3.2	0.3
Not reported	61	55	52	52	50	51	-3.5	2.8

NOTES: All calculations are based on unrounded numbers. Average annual percent change calculated by use of compounding.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Program Management and Medical Information System, April 1992 update, 1985-90.

Table 11

**Medicare end stage renal disease program enrollment for patients with functioning grafts,
by age, sex, race, and primary diagnosis: 1985-90**

Age, sex, race, and primary diagnosis	1985	1986	1987	1988	1989	1990	Percent 1990	Average annual percent change	Percent change 1989-90
Number of patients									
Total	18,466	22,597	26,270	29,240	32,304	36,096	100.0	14.3	11.7
Age									
Under 15 years	604	694	772	820	875	909	2.5	8.5	3.9
15-24 years	1,923	2,175	2,303	2,306	2,340	2,484	6.9	5.3	6.2
25-34 years	4,993	5,857	6,347	6,577	6,919	7,411	20.5	8.2	7.1
35-44 years	5,157	6,358	7,411	8,285	9,197	10,342	28.7	14.9	12.4
45-54 years	3,588	4,484	5,473	6,332	7,061	7,883	21.8	17.0	11.6
55-64 years	1,883	2,554	3,234	3,908	4,572	5,295	14.7	23.0	15.8
65-74 years	306	456	699	972	1,279	1,687	4.7	40.7	31.9
75 years or over	12	19	31	40	61	85	0.2	47.9	39.3
Sex									
Male	11,652	14,270	16,499	18,183	19,984	22,219	61.6	13.8	11.2
Female	6,814	8,327	9,771	11,057	12,320	13,877	38.4	15.3	12.6
Race									
Asian	247	358	464	553	652	793	2.2	26.3	21.6
Black	3,404	4,138	4,738	5,332	5,839	6,479	17.9	13.7	11.0
White	14,417	17,663	20,575	22,785	25,174	28,094	77.8	14.3	11.6
American Indian	168	199	240	280	326	370	1.0	17.1	13.5
Other/unknown	230	239	253	290	313	360	1.0	9.4	15.0
Primary diagnosis									
Diabetes	2,863	3,780	4,574	5,231	5,996	6,893	19.1	19.2	15.0
Glomerulonephritis	5,080	6,168	7,199	7,938	8,667	9,671	26.8	13.7	11.6
Hypertension	1,933	2,471	2,968	3,463	3,858	4,386	12.2	17.8	13.7
Polycystic kidney disease	1,001	1,331	1,683	2,026	2,280	2,638	7.3	21.4	15.7
Interstitial nephritis	789	969	1,143	1,257	1,392	1,554	4.3	14.5	11.6
Obstructive nephropathy	594	692	755	782	839	916	2.5	9.0	9.2
Other	1,095	1,443	1,687	1,945	2,224	2,527	7.0	18.2	13.6
Unknown	1,773	2,132	2,414	2,479	2,556	2,676	7.4	8.6	4.7
Not reported	3,338	3,611	3,847	4,119	4,492	4,835	13.4	7.7	7.6

NOTES: All calculations are based on unrounded numbers. Average annual percent change calculated by use of compounding.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Program Management and Medical Information System, April 1992 update, 1985-90.

Table 12

Medicare end stage renal disease program enrollment per million population for patients with functioning grafts, by age, sex, race, and primary diagnosis: 1985-90

Age, sex, race, and primary diagnosis	1985	1986	1987	1988	1989	1990	Average annual percent change	Percent change 1989-90
Number of patients per million								
Total	78	94	109	120	131	145	13.3	10.7
Age								
Under 15 years	12	13	15	15	16	17	8.1	3.4
15-24 years	49	56	60	61	63	68	6.8	7.8
25-34 years	124	144	154	157	163	172	6.6	5.6
35-44 years	163	194	218	235	253	275	11.0	8.9
45-54 years	149	185	223	256	283	313	15.9	10.6
55-64 years	88	120	152	184	216	250	23.3	16.1
65-74 years	18	27	40	55	72	93	38.7	30.1
75 years or over	1	2	3	3	5	6	44.2	36.0
Sex								
Male	101	122	140	153	166	183	12.7	10.2
Female	56	68	79	88	97	109	14.3	11.7
Race								
Asian	46	62	76	85	95	109	18.9	15.3
Black	121	145	164	182	197	216	12.4	9.7
White	74	91	105	115	127	141	13.6	11.0
American Indian	99	114	134	151	171	189	13.7	10.4
Other/unknown	—	—	—	—	—	—	—	—
Primary diagnosis								
Diabetes	12	16	19	21	24	28	18.1	13.9
Glomerulonephritis	21	26	30	32	35	39	12.7	10.6
Hypertension	8	10	12	14	16	18	16.7	12.7
Polycystic kidney disease	4	6	7	8	9	11	20.3	14.7
Interstitial nephritis	3	4	5	5	6	6	13.5	10.6
Obstructive nephropathy	2	3	3	3	3	4	8.1	8.2
Other	5	6	7	8	9	10	17.1	12.6
Unknown	7	9	10	10	10	11	7.6	3.8
Not reported	14	15	16	17	18	19	6.7	6.7

NOTES: All calculations are based on unrounded numbers. Average annual percent increase calculated by use of compounding.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Program Management and Medical Information System, April 1992 update, 1985-90.

Patient treatment trends

Treatment trends

The statistics in this section are taken from the annual ESRD Facility Survey, Form HCFA-2744. The exception is Table 18, which is based on counts of transplant records (HCFA-2745-U4) linked with beneficiary entitlement data in the ESRD PMMIS. The facility survey covers all patients receiving services at Medicare-approved dialysis facilities and transplant centers. All figures shown are as of December 31 for each year. Because they include both Medicare entitled and non-Medicare patients, these numbers are not comparable to those for the Medicare ESRD population presented in other sections of this report. Also, because only Medicare-approved facilities are surveyed, the numbers do not represent the entire U.S. ESRD population. These caveats must be kept in mind when using Tables 13-17 and 19.

Dialysis patients

Data for dialysis patients by Medicare and non-Medicare categories for years 1980 through 1991 are shown in Table 13.

The total number of dialysis patients increased by 9.8 percent during 1991. The number of Medicare covered dialysis patients increased by 10.0 percent. The number of non-Medicare patients increased by 6.8 percent. The rates of growth in the number of non-Medicare patients since 1983 does not reflect the steady growth seen for the Medicare patients. From 1980 to 1991, the rate of growth of non-Medicare dialysis patients was slightly greater than for Medicare dialysis patients (9.7 percent and 9.5 percent, respectively). As a result, non-Medicare patients accounted for 7.2 percent of all dialysis patients in 1991, up slightly from 7.1 percent in 1980.

The dialysis population continues to increase at a rapid pace. The rate of increase in each of the years, 1989, 1990 and 1991 was greater than the overall rate of increase since 1980.

Data on the ESRD dialysis population, by type and place of dialysis for the years 1986 through 1991, are shown in Table 14. During these years, the total number of dialysis patients, for the facilities reporting, increased from 90,886 in 1986 to 142,488 in 1991, or an average annual growth rate of 9.4 percent.

By far the most common dialysis modality is outpatient hemodialysis. The number of patients receiving dialysis in this modality increased from 72,756 in 1986 (80.1 percent of all dialysis patients) to 116,819 in 1991 (82.0 percent of all dialysis patients). Further, in 1991, the hemodialysis modality accounted for 99.8 percent of those patients dialyzing in-unit (see outpatient). The remaining 0.2 percent of in-unit patients were using peritoneal dialysis. Overall, the in-unit patient population grew at a 9.7 percent annual rate.

There were 25,117 patients dialyzing at home in 1991, which was 17.6 percent of all dialysis patients. As a percent of all dialysis patients, this represents a net decrease from 1986 when there were 17,086 home

patients, representing 18.8 percent of all dialysis patients. Within the home dialysis population, CAPD was consistently the most frequently selected modality for dialysis. There were 18,881 patients in this group in 1991, compared to 6,236 for all other at-home modalities. However, CCPD was the fastest growing treatment, compared to both in-unit and other home patient categories. The average annual rate of increase for CCPD from 1986 to 1991 was 23.8 percent; the annual rate of increase from 1990 to 1991 was 26.7 percent. CAPD grew at a slightly higher rate (9.6 percent per year) than the total dialysis population (9.4 percent); however, the use of both home hemodialysis and home peritoneal dialysis decreased during this period (-9.2 and -2.0 percent, respectively). Overall, the home patient population grew at an 8.0 percent annual rate.

The number of persons completing self-dialysis training is shown in Table 15. The number of patients completing home dialysis training experienced an average annual percent increase of 11.9 percent. The data in Table 15 support the finding in Table 14 that CCPD was the fastest growing treatment. The average annual rate of increase for CCPD was 22.6 percent. The percent change from 1990 to 1991 was 27.0 percent. The highest percentage increase experienced was in 1989 to 1990 when CCPD had a 34.9 percent change.

Transplant patients

Data for kidney transplants, by Medicare and non-Medicare categories, are shown in Table 16. During the years 1980 through 1986, the number of persons receiving a kidney transplant increased from 4,676 to 8,948, an average increase of 11.4 percent per year. However, from 1986 to 1989, there was no growth in kidney transplants, but a slight drop to 8,885. In 1990, there was a 10.1 percent increase in the number of transplant patients. The average annual rate of increase in the number of transplanted patients from 1980 through 1991 was 7.2 percent, and the average annual rate of increase was the same for Medicare covered transplants (7.2 percent). The average annual rate of increase for non-Medicare covered transplants was 6.4 percent. In 1991, 91.9 percent of all kidney transplants were covered by Medicare.

Kidney transplants by donor type are shown in Table 17. The overall trends are very similar to those in Table 16. The number of kidney transplants is slightly higher than the number of transplanted patients because a few patients receive more than one transplant during a calendar year. Cadaver donor transplants increased at a faster rate than did living-related donor transplants during the 1980 through 1990 period (7.6 percent and 5.5 percent annual rates of increase, respectively). In 1980, cadaver donor transplants accounted for 72.9 percent of all reported kidney transplants. By 1991, this had risen to 76.2 percent. In 1991, there was a slight decrease (0.8 percent) in the number of cadaver transplants. Beginning in 1988, living donor transplants were reported

Table 13
Dialysis patients, by Medicare coverage: 1980-1991¹

Year	Total		Medicare coverage			
			Medicare		Non-Medicare	
	Number	Percent change	Number	Percent change	Number	Percent change
1980	52,364	—	48,665	—	3,699	—
1981	58,924	12.5	55,127	13.3	3,797	2.7
1982	65,765	11.6	61,782	12.1	3,983	4.9
1983	71,987	9.5	67,569	9.4	4,418	10.9
1984	78,483	9.0	73,485	8.8	4,998	13.1
1985	84,797	8.0	79,134	7.7	5,663	13.3
1986	90,886	7.2	84,815	7.2	6,071	7.2
1987	98,432	8.3	91,361	7.7	7,071	16.5
1988	105,958	7.7	98,191	7.5	7,767	9.8
1989	116,169	9.6	107,447	9.4	8,722	12.3
1990	129,800	11.7	120,218	11.9	9,582	9.9
1991	142,488	9.8	132,251	10.0	10,237	6.8
Average annual percent change						
1980-1991	—	9.5	—	9.5	—	9.7

¹Counts are as of December 31 of each year from the End Stage Renal Disease Facility Surveys.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the End Stage Renal Disease Facility Survey, 1980-91.

Table 14
End stage renal disease dialysis population, by type and place of dialysis: 1986-91¹

Type and place of dialysis	1986	1987	1988	1989	1990	1991	Average annual percent change	Percent change 1990-91
Number of patients								
Total	90,886	98,432	105,958	116,169	129,800	142,488	9.4	9.8
Outpatient hemodialysis	72,756	79,352	86,250	95,371	106,432	116,819	9.9	9.8
Outpatient peritoneal	510	440	365	319	273	234	-14.4	-14.3
Home hemodialysis	3,675	3,582	3,197	2,914	2,483	2,266	-9.2	-8.7
Home peritoneal	191	168	326	166	190	173	-2.0	-8.9
CAPD ²	11,913	12,825	13,318	14,830	16,969	18,881	9.6	11.3
CCPD ³	1,307	1,708	1,922	2,311	2,998	3,797	23.8	26.7
Self training	534	357	580	258	455	442	-3.7	-2.9

¹Counts are as of December 31 of each year from the End Stage Renal Disease Facility Surveys.

²Continuous ambulatory peritoneal dialysis.

³Continuous cycling peritoneal dialysis.

NOTE: Average annual percent change calculated by use of compounding.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the End Stage Renal Disease Facility Survey, 1986-91.

Table 15
Dialysis patients completing training, by type of dialysis: 1986-91

Type of dialysis	1986	1987	1988	1989	1990	1991	Average annual change	Percent 1990-91
	Number of patients							
Total completed dialysis training ¹	8,706	9,477	10,445	11,032	13,096	15,252	11.9	16.5
Hemodialysis	874	823	983	800	976	681	-4.9	-30.2
Peritoneal	141	212	191	138	166	138	-0.4	-16.9
CAPD ²	6,723	7,184	7,882	8,529	9,843	11,753	11.8	19.4
CCPD ³	968	1,258	1,389	1,565	2,111	2,680	22.6	27.0

¹ Includes a small percentage of hemodialysis and peritoneal dialysis patients who completed training during the year for self-care outpatient dialysis.

² Continuous ambulatory peritoneal dialysis.

³ Continuous cycling peritoneal dialysis.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the End Stage Renal Disease Facility Survey, 1986-91.

as living-related and living-unrelated. Thus, about 3 percent (56 transplants) of the 7.7 percent decrease in living-related donor transplants between 1987 and 1988 is a reporting artifact. There were 2,296 living-related donor transplants in 1991, representing 22.9 percent of all reported kidney transplants, and there were 86 living-unrelated donor transplants, representing the remaining 0.9 percent of all reported kidney transplants.

Trends in kidney transplantation by age, sex, race, and diagnostic category are shown in Table 18. As stated above, figures in Tables 16 and 18 will not be exactly comparable because the data are compiled from two different sources with different lead times for data input. However, the trends of the data in these tables are comparable. In 1985, there were 7,196 Medicare entitled persons who received a kidney transplant. By 1990, the number was 8,983, an average annual rate of increase of 4.5 percent. However, all of the increase occurred between 1985 and 1986, when the number of Medicare transplant patients peaked at 8,500. From 1987 to 1989 there were slight declines in the number of Medicare patients receiving a transplant.

In 1985, persons under the age of 35 accounted for 44.5 percent of all transplant recipients. The number of transplant recipients in these age groups increased by 1.0 percent through 1990, at which point they accounted for 36.5 percent of transplant recipients. The 35-44 years of age group has consistently remained the highest reported age group of transplant recipients in all years except 1986 when the percentage of persons transplanted in this age category decreased slightly by 0.9 percent. The average annual increase in the number of transplant recipients in the 35 and over age groups was 8.2 percent. The average age of transplant recipients increased from 37.0 years in 1985 to 40.2 years in 1990.

Transplants have increased more rapidly among females than among males (5.8 percent versus 3.7 percent average annual rate of increase, respectively). Females accounted for 37.5 percent of Medicare transplant recipients in 1985 and 39.8 percent in 1990.

Asians and American Indians had the highest average annual rates of growth in numbers of transplant recipients (16.0 percent and 5.5 percent, respectively). However, due to the small number of Medicare ESRD beneficiaries in these two groups, they still accounted for only 3.6 percent of all transplant recipients. Increases in the number of transplant recipients were relatively similar for black (4.0 percent per year) and white beneficiaries (4.3 percent per year). In 1990, 20.5 percent of Medicare kidney transplant recipients were black and 75.3 percent were white.

The number of Medicare transplant recipients increased most rapidly for persons whose renal failure was attributed to polycystic kidney disease (8.7 percent per year), hypertension (7.5 percent per year), and diabetes (7.0 percent per year). In 1990, persons whose renal failure was attributed to glomerulonephritis, diabetes, and hypertension accounted for 26.7, 21.0, and 14.1 percent of all transplant recipients, respectively.

From 1983 to 1991, the number of persons awaiting kidney transplants increased from 7,176 to 18,234, an average annual rate of increase of 12.4 percent (Table 19). In 1983, 10.0 percent of all dialysis patients were awaiting a transplant. From 1986 to 1989, the percent of total patients awaiting a kidney transplant remained relatively constant at 12.2 to 12.6 percent and increased to 13.5 percent in 1990, which was the highest percent of patients awaiting a kidney transplant. In 1991 this decreased to 12.8 percent.

Table 16
Kidney transplant patients, by Medicare coverage: 1980-91

Year	Total		Medicare coverage			
			Medicare		Non-Medicare	
	Number	Percent change	Number	Percent change	Number	Percent change
1980	4,676	—	4,266	—	410	—
1981	4,898	4.7	4,440	4.1	458	11.7
1982	5,252	7.2	4,846	9.1	406	-11.4
1983	6,098	16.1	5,591	15.4	507	24.9
1984	6,933	13.7	6,304	12.8	629	24.1
1985	7,676	10.7	7,073	12.2	603	-4.1
1986	8,948	16.6	8,258	16.8	690	14.4
1987	8,949	0.0	8,298	0.5	651	-5.7
1988	8,909	-0.4	8,175	-1.5	734	12.7
1989	8,885	-0.3	8,111	-0.8	774	5.4
1990	9,779	10.1	8,973	10.6	806	4.1
1991	10,011	2.4	9,197	2.5	814	1.0
Average annual percent change						
1980-91	—	7.2	—	7.2	—	6.4

NOTE: Average annual percent change calculated by use of compounding.

SOURCES: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the End Stage Renal Disease Facility Survey, 1980-91.

Table 17
Kidney transplants, by donor type: 1980-91

Year	Total		Donor type					
			Cadaver		Living-related		Living-unrelated ¹	
	Number	Percent change	Number	Percent change	Number	Percent change	Number	Percent change
1980	4,704	—	3,427	—	1,277	—	—	—
1981	4,905	4.3	3,445	0.5	1,460	14.3	—	—
1982	5,358	9.2	3,681	6.9	1,677	14.9	—	—
1983	6,112	14.1	4,328	17.6	1,784	6.4	—	—
1984	6,968	14.0	5,264	21.6	1,704	-4.5	—	—
1985	7,695	10.4	5,819	10.5	1,876	10.1	—	—
1986	8,976	16.6	7,089	21.8	1,887	0.6	—	—
1987	8,967	-0.1	7,060	-0.4	1,907	1.1	—	—
1988	8,932	-0.4	7,116	0.8	1,760	-7.7	56	—
1989	8,899	-0.4	7,006	-1.5	1,823	3.6	70	25.0
1990	9,796	10.1	7,705	10.0	2,001	9.8	90	28.6
1991	10,026	2.3	7,644	-0.8	2,296	14.7	86	-4.4
Average annual percent change								
1980-91	—	7.1	—	7.6	—	5.5	—	15.4

¹The living-unrelated category was added to the End Stage Renal Disease Facility Survey in 1988.

NOTE: Average annual percent change calculated by use of compounding.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the End Stage Renal Disease Facility Survey, 1980-91.

Table 18
Medicare end stage renal disease program transplants,
by age, sex, race, and primary diagnosis: 1985-90

Age, sex, race, and primary diagnosis	1985	1986	1987	1988	1989	1990	Percent 1990	Average annual percent increase	Percent increase 1989-90
Total	7,196	8,500	8,386	8,258	8,213	8,983	100.0	4.5	9.4
Age									
Under 15 years	394	383	413	360	342	319	3.6	-4.1	-6.7
15-24 years	974	1,062	944	881	848	895	10.0	-1.7	5.5
25-34 years	1,837	2,218	1,950	1,896	1,937	2,055	22.9	2.3	6.1
35-44 years	1,900	2,178	2,241	2,188	2,207	2,399	26.7	4.8	8.7
45-54 years	1,380	1,669	1,681	1,683	1,639	1,839	20.5	5.9	12.2
55-64 years	639	869	980	1,036	1,038	1,185	13.2	13.1	14.2
65-74 years	66	117	173	208	195	279	3.1	33.4	43.1
75 years or over	6	4	4	6	7	12	0.1	14.9	71.4
Sex									
Male	4,501	5,308	5,186	5,031	4,990	5,407	60.2	3.7	8.4
Female	2,695	3,192	3,200	3,227	3,223	3,576	39.8	5.8	11.0
Race									
Asian	109	163	188	171	186	229	2.5	16.0	23.1
Black	1,514	1,708	1,678	1,707	1,666	1,843	20.5	4.0	10.6
White	5,477	6,521	6,403	6,223	6,210	6,760	75.3	4.3	8.9
American Indian	69	76	84	94	98	90	1.0	5.5	-8.2
Other/unknown	27	32	33	63	53	61	0.7	17.7	15.1
Primary diagnosis									
Diabetes	1,346	1,686	1,623	1,622	1,706	1,885	21.0	7.0	10.5
Glomerulonephritis	1,993	2,295	2,320	2,236	2,146	2,401	26.7	3.8	11.9
Hypertension	883	1,052	1,097	1,136	1,069	1,266	14.1	7.5	18.4
Polycystic kidney disease	461	601	661	642	586	699	7.8	8.7	19.3
Interstitial nephritis	370	405	387	320	351	363	4.0	-0.4	3.4
Obstructive nephropathy	186	227	205	149	166	178	2.0	-0.9	7.2
Other	570	692	647	655	688	734	8.2	5.2	6.7
Unknown	673	715	680	622	615	638	7.1	-1.1	3.7
Not reported	714	827	766	876	886	819	9.1	2.8	-7.6

NOTES: All calculations are based on unrounded numbers. Average annual percent increase calculated by use of compounding.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Program Management and Medical Information System, April 1992 update, 1985-90.

Table 19
Patients awaiting transplants: 1983-91

Year	Number of patients	Percent increase	Percent of dialysis population
1983	7,176	--	10.0
1984	8,562	19.3	10.9
1985	9,791	14.4	11.5
1986	11,108	13.5	12.2
1987	12,140	9.3	12.3
1988	13,282	9.4	12.5
1989	14,687	10.6	12.6
1990	17,556	19.5	13.5
1991	18,234	3.9	12.8
Average annual percent increase			
1983-91	--	12.4	--

NOTE: Average annual percent increase calculated by use of compounding.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the End Stage Renal Disease Facility Survey, 1983-91.

End stage renal disease facility data and patient counts

The information presented in Tables 20 through 35 was collected through the use of the ESRD Facility Survey, Form HCFA-2744, and covers the period of January 1, 1991 through December 31, 1991. The rate of compliance of surveyed facilities in completing the ESRD Facility Survey was 100 percent for 1991. It is important to note that the number of facilities surveyed and reporting, as summarized in Tables 20 through 35, does not equal the total number of Medicare-approved providers of renal care as reported in Tables 54, 55, and 56. Some Medicare-approved hospitals were not surveyed because they provide acute dialysis only or they serve as a backup to a chronic dialysis facility; i.e., they do not provide routine maintenance dialysis for ESRD patients. Other Medicare-approved renal providers were not requested to complete an ESRD Facility Survey because they were so recently certified that there was insufficient time to include them in the survey population. Consequently, the renal facilities' counts reported in Tables 20 through 35 are not directly comparable to the provider counts in Tables 54, 55, and 56.

It must also be noted that this section includes only Medicare-approved renal providers and, thus, this section does not reflect all renal dialysis facilities in the country. There are a number of facilities providing chronic dialysis services (such as several Department of Veterans Affairs and Department of Defense facilities), that are not Medicare-approved and are not included in Tables 20 to 35. A brief summary of the number of patients receiving dialysis services from Department of Veterans Affairs facilities is provided in Table 36. Therefore, due to slight differences in reporting facilities and some imprecision in determining Medicare dialysis status, the survey data will not agree with the PMMIS enrollment data shown in Tables 8 through 12.

The survey tables (Tables 20 through 35) are arrayed either nationally or by State. Tables 23 through 26 and Tables 34 and 35 provide aggregate dialysis patient population figures as of December 31, 1991 (end of the survey period). The other tables reflect activity for the entire survey period, unless otherwise noted. Tables 21, 22, 29, and 31 display patients by Medicare status: Currently enrolled in Medicare, Medicare application pending, and non-Medicare. Patients appearing in the non-Medicare category may include those who are covered by the Department of Veterans Affairs, those who are covered by private insurance, those who are covered by Medicaid, and foreign nationals. Tables 34 and 35 display the dialysis patient population by type of facilities; independent and hospital, respectively, as well as profit and nonprofit facilities.

In the 1991 facility survey we found that, as of December 31, 1991, 86.9 percent of all ESRD patients were entitled to Medicare benefits; 6.0 percent had applications for Medicare entitlement pending; and 7.2 percent were not eligible for Medicare. (See Tables 21 and 29.) Of the 142,488 dialysis patients reported from the facility survey, 79,324 (55.7 percent) were dialyzing at independent, for-profit dialysis facilities. (See Table 34.) From 1982 through 1991, the number of patients dialyzing at independent facilities experienced an average annual percent change of 11.8 percent for outpatients and 15.1 percent for home patients, compared to 4.4 percent for outpatients and 4.3 percent for home patients dialyzing under the care of hospital facilities. (See Table 35.) We estimate that approximately 300 home hemodialysis patients are not included in the facility survey counts. This is due to idiosyncratic reporting of several health care delivery entities.

Table 20
End stage renal disease facilities surveyed , by State: 1991

State	Dialysis facilities surveyed	Transplant centers surveyed
Total	2,096	228
Alabama	42	2
Alaska	2	0
Arizona	41	5
Arkansas	36	3
California	236	24
Colorado	19	4
Connecticut	20	2
Delaware	6	0
District of Columbia	21	5
Florida	146	7
Georgia	82	4
Hawaii	12	1
Idaho	7	0
Illinois	87	8
Indiana	38	2
Iowa	14	3
Kansas	17	2
Kentucky	27	3
Louisiana	68	7
Maine	6	1
Maryland	53	3
Massachusetts	38	10
Michigan	52	10
Minnesota	30	5
Mississippi	33	1
Missouri	50	9
Montana	7	0
Nebraska	11	3
Nevada	5	2
New Hampshire	6	0
New Jersey	37	3
New Mexico	17	2
New York	116	15
North Carolina	61	5
North Dakota	9	3
Ohio	53	12
Oklahoma	33	6
Oregon	16	1
Pennsylvania	101	11
Puerto Rico	18	1
Rhode Island	6	0
South Carolina	45	1
South Dakota	8	0
Tennessee	58	8
Texas	142	17
Utah	15	2
Vermont	2	1
Virgin Islands	1	0
Virginia	71	4
Washington	21	5
West Virginia	15	2
Wisconsin	34	3
Wyoming	2	0
American Samoa	1	0
Guam	1	0
Mariana Islands	1	0

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the End Stage Renal Disease Facility Survey, 1991.

Table 21
Dialysis patient eligibility status, by State: 1991

State	Facilities reporting	Total dialysis patients	Eligibility status		
			Currently enrolled in Medicare	Medicare application pending	Non-Medicare
Total	2,096	142,488	123,751	8,500	10,237
Alabama	42	3,012	2,667	125	220
Alaska	2	76	61	9	6
Arizona	41	2,186	1,785	108	293
Arkansas	36	1,183	1,081	52	50
California	236	16,416	13,344	996	2,076
Colorado	19	1,237	1,073	56	108
Connecticut	20	1,748	1,511	114	123
Delaware	6	451	369	36	46
District of Columbia	21	1,276	929	108	239
Florida	146	7,858	6,989	547	322
Georgia	82	4,690	4,291	120	279
Hawaii	12	834	731	56	47
Idaho	7	247	231	11	5
Illinois	87	6,588	5,411	649	528
Indiana	38	2,908	2,652	165	91
Iowa	14	1,001	915	62	24
Kansas	17	1,012	939	48	25
Kentucky	27	1,599	1,409	91	99
Louisiana	68	3,383	3,056	152	175
Maine	6	317	237	32	48
Maryland	53	3,172	2,716	254	202
Massachusetts	38	2,705	2,337	209	159
Michigan	52	4,907	4,211	465	231
Minnesota	30	1,715	1,475	184	56
Mississippi	33	2,072	1,889	87	96
Missouri	50	2,829	2,643	102	84
Montana	7	306	258	24	24
Nebraska	11	619	576	24	19
Nevada	5	508	439	34	35
New Hampshire	6	357	327	8	22
New Jersey	37	5,043	4,401	267	375
New Mexico	17	902	769	51	82
New York	116	11,541	9,682	673	1,186
North Carolina	61	4,466	4,096	79	291
North Dakota	9	260	239	16	5
Ohio	53	5,340	4,614	396	330
Oklahoma	33	1,335	1,216	88	31
Oregon	16	1,187	1,093	69	25
Pennsylvania	101	7,449	6,479	420	550
Puerto Rico	18	1,926	1,689	95	142
Rhode Island	6	600	507	77	16
South Carolina	45	2,600	2,377	68	155
South Dakota	8	211	197	12	2
Tennessee	58	3,119	2,771	208	140
Texas	142	10,334	9,144	423	767
Utah	15	432	396	26	10
Vermont	2	127	109	15	3
Virgin Islands	1	31	23	2	6
Virginia	71	3,690	3,224	269	197
Washington	21	1,909	1,698	143	68
West Virginia	15	797	720	45	32
Wisconsin	34	1,793	1,615	115	63
Wyoming	2	53	47	4	2
American Samoa	1	28	24	2	2
Guam	1	83	55	6	22
Mariana Islands	1	20	14	3	3

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the End Stage Renal Disease Facility Survey, 1991.

Table 22
Dialysis patient counts national summary, by place of dialysis: 1991

Patient count	Total	Percent	Place of dialysis			
			Outpatient	Percent	Home	Percent
Dialysis patients beginning survey	129,706	—	106,959	82.5	22,747	17.5
Additions	82,345	—	69,622	84.5	12,723	15.5
New starts	53,434	64.9	44,515	63.9	8,919	70.1
Restarted	852	1.0	727	1.0	125	1.0
Transferred in	25,428	30.9	22,186	31.9	3,242	25.5
Returned after transplant	2,631	3.2	2,194	3.2	437	3.4
Losses	69,563	—	58,590	84.2	10,973	15.8
Deaths	31,164	44.8	26,371	45.0	4,793	43.7
Recovered functions	1,938	2.8	1,696	2.9	242	2.2
Transplanted	8,609	12.4	6,197	10.6	2,412	22.0
Transferred out	25,780	37.1	22,517	38.4	3,263	29.7
Discontinued dialysis	1,718	2.5	1,500	2.6	218	2.0
Lost to followup	354	0.5	309	0.5	45	0.4
Number needed to balance ¹	0	—	-620	—	620	—
Dialysis patients end of survey	142,488	—	117,371	82.4	25,117	17.6
Hemodialysis	119,085	83.6	116,819	99.5	2,266	9.0
IPD ²	407	0.3	234	0.2	173	0.7
CAPD ³	19,147	13.4	266	0.2	18,881	75.2
CCPD ⁴	3,849	2.7	52	0.0	3,797	15.1
Medicare status	142,488	—	—	—	—	—
Medicare	123,751	86.9	—	—	—	—
Medicare pending	8,500	6.0	—	—	—	—
Non-Medicare	10,237	7.2	—	—	—	—

¹Accurate counts are not always available because of the movement of home patients, self-care training, and in-unit backup dialysis.

²Intermittent peritoneal dialysis.

³Continuous ambulatory peritoneal dialysis.

⁴Continuous cycling peritoneal dialysis.

NOTE: Percents may not add to total because of rounding.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the End Stage Renal Disease Facility Survey, 1991.

Table 23
Patients receiving care in the outpatient setting, by State: December 31, 1991

State	Facilities reporting	Total outpatients	Outpatient dialysis		Self-dialysis training			
			Hemo ¹	IPD ²	Hemo ¹	IPD ²	CAPD ³	CCPD ⁴
Total	2,096	117,371	116,699	230	120	4	266	52
Alabama	42	2,527	2,516	0	1	0	6	4
Alaska	2	64	64	0	0	0	0	0
Arizona	41	1,836	1,809	0	17	0	9	1
Arkansas	36	954	950	1	0	0	3	0
California	236	14,314	14,277	1	6	0	26	4
Colorado	19	963	958	0	3	0	2	0
Connecticut	20	1,224	1,211	0	1	0	9	3
Delaware	6	377	377	0	0	0	0	0
District of Columbia	21	1,152	1,152	0	0	0	0	0
Florida	146	6,873	6,858	3	0	0	9	3
Georgia	82	4,012	4,004	3	0	0	5	0
Hawaii	12	770	769	0	0	0	0	1
Idaho	7	186	186	0	0	0	0	0
Illinois	87	5,587	5,554	20	7	0	3	3
Indiana	38	2,061	2,050	1	0	0	10	0

See footnotes at end of table.

Table 23—Continued
Patients receiving care in the outpatient setting, by State: December 31, 1991

State	Facilities reporting	Total outpatients	Outpatient dialysis		Self-dialysis training			
			Hemo ¹	IPD ²	Hemo ¹	IPD ²	CAPD ³	CCPD ⁴
Iowa	14	715	706	1	4	0	4	0
Kansas	17	754	750	0	0	0	4	0
Kentucky	24	1,246	1,223	2	3	0	17	1
Louisiana	68	2,949	2,944	2	0	0	1	2
Maine	6	245	245	0	0	0	0	0
Maryland	53	2,699	2,690	1	1	0	6	1
Massachusetts	38	2,234	2,229	0	2	0	3	0
Michigan	52	3,606	3,559	27	2	2	16	0
Minnesota	30	1,441	1,439	0	0	0	1	1
Mississippi	33	1,768	1,766	2	0	0	0	0
Missouri	50	2,152	2,149	0	2	0	1	0
Montana	7	226	223	0	2	0	1	0
Nebraska	11	349	345	0	0	0	4	0
Nevada	5	367	361	1	3	0	1	1
New Hampshire	6	271	271	0	0	0	0	0
New Jersey	37	3,926	3,868	36	8	0	10	4
New Mexico	17	712	712	0	0	0	0	0
New York	116	9,404	9,304	56	24	0	17	3
North Carolina	61	3,426	3,425	0	0	0	0	1
North Dakota	9	218	218	0	0	0	0	0
Ohio	53	4,324	4,310	8	1	0	5	0
Oklahoma	33	1,025	1,022	0	1	0	2	0
Oregon	16	779	769	0	2	0	6	2
Pennsylvania	101	6,276	6,215	24	1	0	25	11
Puerto Rico	18	1,657	1,640	13	0	0	4	0
Rhode Island	6	526	526	0	0	0	0	0
South Carolina	45	2,330	2,320	0	0	0	10	0
South Dakota	8	193	193	0	0	0	0	0
Tennessee	58	2,511	2,496	0	8	2	5	0
Texas	142	9,045	8,976	23	17	0	27	2
Utah	15	342	340	1	0	0	1	0
Vermont	2	90	90	0	0	0	0	0
Virgin Islands	1	31	31	0	0	0	0	0
Virginia	71	3,129	3,119	0	2	0	7	1
Washington	21	1,383	1,377	1	0	0	4	1
West Virginia	15	611	610	0	0	0	1	0
Wisconsin	34	1,338	1,330	3	2	0	1	2
Wyoming	2	42	42	0	0	0	0	0
American Samoa	1	28	28	0	0	0	0	0
Guam	1	83	83	0	0	0	0	0
Mariana Islands	1	20	20	0	0	0	0	0

¹Hemodialysis.

²Intermittent peritoneal dialysis.

³Continuous ambulatory peritoneal dialysis.

⁴Continuous cycling peritoneal dialysis.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the End Stage Renal Disease Facility Survey, 1991.

Table 24
Patients receiving care at home, by State: December 31, 1991

State	Facilities reporting	Total home patients	Hemodialysis	IPD ¹	CAPD ²	CCPD ³
Total	2,096	25,117	2,266	173	18,881	3,797
Alabama	42	485	38	0	361	86
Alaska	2	12	1	0	9	2
Arizona	41	350	24	0	221	105
Arkansas	36	229	12	0	192	25
California	236	2,102	58	0	1582	462
Colorado	19	274	47	0	169	58
Connecticut	20	524	6	0	439	79
Delaware	6	74	0	0	68	6
District of Columbia	21	124	2	0	98	24
Florida	146	985	58	0	700	227
Georgia	82	678	31	10	504	133
Hawaii	12	64	5	0	55	4
Idaho	7	61	4	0	18	39
Illinois	87	1,001	76	7	771	147
Indiana	38	847	59	1	750	37
Iowa	14	286	69	0	188	29
Kansas	17	258	27	0	225	6
Kentucky	27	353	13	12	296	32
Louisiana	68	434	21	0	337	76
Maine	6	72	7	0	50	15
Maryland	53	473	15	0	404	54
Massachusetts	38	471	39	0	344	88
Michigan	52	1,301	82	5	1139	75
Minnesota	30	274	91	0	167	16
Mississippi	33	304	127	0	158	19
Missouri	50	677	41	18	527	91
Montana	7	80	18	0	58	4
Nebraska	11	270	11	0	229	30
Nevada	5	141	27	0	82	32
New Hampshire	6	86	2	0	58	26
New Jersey	37	1,117	118	1	791	207
New Mexico	17	190	2	1	171	16
New York	116	2,137	231	0	1618	288
North Carolina	61	1,040	50	17	740	233
North Dakota	9	42	1	0	38	3
Ohio	53	1,016	38	7	821	150
Oklahoma	33	310	17	20	255	18
Oregon	16	408	50	0	295	63
Pennsylvania	101	1,173	79	4	894	196
Puerto Rico	18	269	26	0	221	22
Rhode Island	6	74	1	0	63	10
South Carolina	45	270	19	0	206	45
South Dakota	8	18	0	0	13	5
Tennessee	58	608	94	28	437	49
Texas	142	1,289	72	9	915	293
Utah	15	90	22	0	63	5
Vermont	2	37	12	0	25	0
Virgin Islands	1	0	0	0	0	0
Virginia	71	561	77	6	433	45
Washington	21	526	298	26	175	27
West Virginia	15	186	11	0	151	24
Wisconsin	34	455	37	1	347	70
Wyoming	2	11	0	0	10	1
American Samoa	1	0	0	0	0	0
Guam	1	0	0	0	0	0
Mariana Islands	1	0	0	0	0	0

¹Intermittent peritoneal dialysis.

²Continuous ambulatory peritoneal dialysis.

³Continuous cycling peritoneal dialysis.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the End Stage Renal Disease Facility Survey, 1991.

Table 25
Dialysis treatment setting of end stage renal disease patients, by State: 1991

State	Facilities reporting	Total dialysis patients	Dialyzed outpatient		Dialyzed at home	
			Total	Percent	Total	Percent
Total	2,096	142,488	117,371	82.4	25,117	17.6
Alabama	42	3,012	2,527	83.9	485	16.1
Alaska	2	76	64	84.2	12	15.8
Arizona	41	2,186	1,836	84.0	350	16.0
Arkansas	36	1,183	954	80.6	229	19.4
California	236	16,416	14,314	87.2	2,102	12.8
Colorado	19	1,237	963	77.8	274	22.2
Connecticut	20	1,748	1,224	70.0	524	30.0
Delaware	6	451	377	83.6	74	16.4
District of Columbia	21	1,276	1,152	90.3	124	9.7
Florida	146	7,858	6,873	87.5	985	12.5
Georgia	82	4,690	4,012	85.5	678	14.5
Hawaii	12	834	770	92.3	64	7.7
Idaho	7	247	186	75.3	61	24.7
Illinois	87	6,588	5,587	84.8	1,001	15.2
Indiana	38	2,908	2,061	70.9	847	29.1
Iowa	14	1,001	715	71.4	286	28.6
Kansas	17	1,012	754	74.5	258	25.5
Kentucky	27	1,599	1,246	77.9	353	22.1
Louisiana	68	3,383	2,949	87.2	434	12.8
Maine	6	317	245	77.3	72	22.7
Maryland	53	3,172	2,699	85.1	473	14.9
Massachusetts	38	2,705	2,234	82.6	471	17.4
Michigan	52	4,907	3,606	73.5	1,301	26.5
Minnesota	30	1,715	1,441	84.0	274	16.0
Mississippi	33	2,072	1,768	85.3	304	14.7
Missouri	50	2,829	2,152	76.1	677	23.9
Montana	7	306	226	73.9	80	26.1
Nebraska	11	619	349	56.4	270	43.6
Nevada	5	508	367	72.2	141	27.8
New Hampshire	6	357	271	75.9	86	24.1
New Jersey	37	5,043	3,926	77.9	1,117	22.1
New Mexico	17	902	712	78.9	190	21.1
New York	116	11,541	9,404	81.5	2,137	18.5
North Carolina	61	4,466	3,426	76.7	1,040	23.3
North Dakota	9	260	218	83.8	42	16.2
Ohio	53	5,340	4,324	81.0	1,016	19.0
Oklahoma	33	1,335	1,025	76.8	310	23.2
Oregon	16	1,187	779	65.6	408	34.4
Pennsylvania	101	7,449	6,276	84.3	1,173	15.7
Puerto Rico	18	1,926	1,657	86.0	269	14.0
Rhode Island	6	600	526	87.7	74	12.3
South Carolina	45	2,600	2,330	89.6	270	10.4
South Dakota	8	211	193	91.5	18	8.5
Tennessee	58	3,119	2,511	80.5	608	19.5
Texas	142	10,334	9,045	87.5	1,289	12.5
Utah	15	432	342	79.2	90	20.8
Vermont	2	127	90	70.9	37	29.1
Virgin Islands	1	31	31	100.0	0	0.0
Virginia	71	3,690	3,129	84.8	561	15.2
Washington	21	1,909	1,383	72.4	526	27.6
West Virginia	15	797	611	76.7	186	23.3
Wisconsin	34	1,793	1,338	74.6	455	25.4
Wyoming	2	53	42	79.2	11	20.8
American Samoa	1	28	28	100.0	0	0.0
Guam	1	83	83	100.0	0	0.0
Mariana Islands	1	20	20	100.0	0	0.0

NOTE: Percents may not add to total because of rounding.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the End Stage Renal Disease Facility Survey, 1991.

Table 26
Patients completing a self-dialysis training course during the calendar year, by State: 1991

State	Facilities reporting	Total patients	Hemo-dialysis	IPD ¹	CAPD ²	CCPD ³
Total	991	15,252	681	138	11,753	2,680
Alabama	16	235	6	0	146	83
Alaska	1	7	1	0	6	0
Arizona	19	280	20	0	176	84
Arkansas	14	142	4	0	118	20
California	113	1,624	24	0	1,260	340
Colorado	9	126	15	0	78	33
Connecticut	16	354	3	0	299	52
Delaware	1	48	0	0	45	3
District of Columbia	7	80	5	0	63	12
Florida	69	608	4	0	458	146
Georgia	37	474	7	15	353	99
Hawaii	2	43	18	0	23	2
Idaho	3	38	1	0	23	14
Illinois	37	437	13	2	346	76
Indiana	17	351	12	0	316	23
Iowa	10	166	61	0	81	24
Kansas	7	113	2	0	107	4
Kentucky	18	265	4	6	228	27
Louisiana	19	297	4	0	212	81
Maine	4	121	3	0	105	13
Maryland	24	323	15	0	279	29
Massachusetts	22	255	2	0	193	60
Michigan	32	800	11	9	714	66
Minnesota	8	142	11	0	114	17
Mississippi	8	140	28	0	96	16
Missouri	27	353	16	8	261	68
Montana	5	38	5	0	29	4
Nebraska	4	140	2	0	112	26
Nevada	3	97	18	0	55	24
New Hampshire	3	55	0	0	50	5
New Jersey	21	557	12	0	422	123
New Mexico	7	108	0	0	96	12
New York	66	1,291	95	1	1,044	151
North Carolina	28	820	22	0	557	241
North Dakota	5	36	1	0	28	7
Ohio	28	584	9	12	484	79
Oklahoma	12	173	1	16	143	13
Oregon	10	232	20	0	176	36
Pennsylvania	65	702	9	2	559	132
Puerto Rico	6	138	2	0	125	11
Rhode Island	3	50	0	5	30	15
South Carolina	13	208	14	0	152	42
South Dakota	2	11	0	0	7	4
Tennessee	23	349	26	31	250	42
Texas	63	811	53	4	573	181
Utah	7	56	4	0	46	6
Vermont	1	13	3	0	10	0
Virgin Islands	0	0	0	0	0	0
Virginia	34	307	13	5	259	30
Washington	10	212	67	16	112	17
West Virginia	10	113	4	1	81	27
Wisconsin	21	319	11	5	244	59
Wyoming	1	10	0	0	9	1
American Samoa	0	0	0	0	0	0
Guam	0	0	0	0	0	0
Mariana Islands	0	0	0	0	0	0

¹Intermittent peritoneal dialysis.

²Continuous ambulatory peritoneal dialysis.

³Continuous cycling peritoneal dialysis.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the End Stage Renal Disease Facility Survey, 1991.

Table 27
Outpatient dialysis treatments given during the calendar year, by State: 1991

State	Facilities reporting	Total ¹ treatments	Hemodialysis	IPD ²
Total	2,096	16,159,051	16,104,132	54,919
Alabama	42	391,932	391,227	705
Alaska	2	7,732	7,732	0
Arizona	41	256,520	256,513	7
Arkansas	36	129,271	129,119	152
California	236	1,955,451	1,955,180	271
Colorado	19	132,733	132,733	0
Connecticut	20	183,730	181,537	2,193
Delaware	6	51,467	51,467	0
District of Columbia	21	154,636	154,275	361
Florida	146	955,447	954,673	774
Georgia	82	548,888	542,912	5,976
Hawaii	12	109,054	109,054	0
Idaho	7	24,053	24,053	0
Illinois	87	771,625	763,223	8,402
Indiana	38	284,044	284,017	27
Iowa	14	103,056	103,010	46
Kansas	17	113,240	113,240	0
Kentucky	27	166,226	165,831	395
Louisiana	68	407,211	407,107	104
Maine	6	34,377	34,377	0
Maryland	53	369,920	369,483	437
Massachusetts	38	306,723	306,680	43
Michigan	52	479,240	475,494	3,746
Minnesota	30	200,231	200,082	149
Mississippi	33	246,636	246,239	397
Missouri	50	297,460	296,636	824
Montana	7	30,603	30,580	23
Nebraska	11	44,921	44,815	106
Nevada	5	49,167	49,125	42
New Hampshire	6	36,415	36,415	0
New Jersey	37	523,170	517,137	6,033
New Mexico	17	98,218	98,218	0
New York	116	1,273,372	1,267,242	6,130
North Carolina	61	481,367	481,211	156
North Dakota	9	30,267	30,267	0
Ohio	53	560,750	559,795	955
Oklahoma	33	142,813	142,714	99
Oregon	16	104,852	104,622	230
Pennsylvania	101	859,212	853,430	5,782
Puerto Rico	18	238,476	237,362	1,114
Rhode Island	6	70,700	70,695	5
South Carolina	45	329,667	329,188	479
South Dakota	8	26,146	26,146	0
Tennessee	58	340,317	339,079	1,238
Texas	142	1,231,540	1,227,761	3,779
Utah	15	49,952	49,747	205
Vermont	2	11,705	11,705	0
Virgin Islands	1	3,498	3,498	0
Virginia	71	452,521	449,734	2,787
Washington	21	195,839	195,535	304
West Virginia	15	87,795	87,684	111
Wisconsin	34	181,694	181,362	332
Wyoming	2	5,359	5,359	0
American Samoa	1	3,669	3,669	0
Guam	1	11,222	11,222	0
Mariana Islands	1	2,921	2,921	0

¹Does not include training treatments.

²Intermittent peritoneal dialysis.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the End Stage Renal Disease Facility Survey, 1991.

Table 28
Dialysis training treatments given during the calendar year, by State: 1991

State	Facilities reporting	Total training treatments	Hemodialysis	IPD ¹	CAPD ²	CCPD ³
Total	2,096	186,071	27,760	848	126,476	30,987
Alabama	42	1,932	350	0	1,032	550
Alaska	2	76	21	0	55	0
Arizona	41	3,202	1,354	0	1,457	391
Arkansas	36	1,226	130	0	952	144
California	236	17,555	1,134	0	13,996	2,425
Colorado	19	1,730	486	0	777	467
Connecticut	20	6,506	32	0	6,056	418
Delaware	6	280	0	0	271	9
District of Columbia	21	693	72	0	552	69
Florida	146	16,167	95	0	11,380	4,692
Georgia	82	2,773	66	100	2,137	470
Hawaii	12	465	170	0	275	20
Idaho	7	159	8	0	104	47
Illinois	87	5,946	1,842	20	3,339	745
Indiana	38	2,902	201	7	2,415	279
Iowa	14	2,171	878	0	1,158	135
Kansas	17	987	37	0	926	24
Kentucky	27	1,853	122	32	1,445	254
Louisiana	68	1,877	45	0	1,338	494
Maine	6	307	52	0	198	57
Maryland	53	3,221	467	0	2,150	604
Massachusetts	38	1,607	90	0	1,185	332
Michigan	52	5,698	306	56	5,025	311
Minnesota	30	999	44	0	803	152
Mississippi	33	1,471	536	0	784	151
Missouri	50	2,399	214	66	1,674	445
Montana	7	498	194	0	276	28
Nebraska	11	1,013	14	0	861	138
Nevada	5	1,344	474	0	663	207
New Hampshire	6	1,162	0	0	1,098	64
New Jersey	37	5,160	1,348	0	2,854	958
New Mexico	17	847	0	0	793	54
New York	116	40,048	4,818	0	28,222	7,008
North Carolina	61	5,381	1,256	0	2,475	1,650
North Dakota	9	337	16	0	227	94
Ohio	53	4,530	174	51	3,396	909
Oklahoma	33	1,070	45	120	867	38
Oregon	16	2,337	511	0	1,472	354
Pennsylvania	101	5,288	200	15	4,009	1,064
Puerto Rico	18	1,773	262	0	1,407	104
Rhode Island	6	423	0	21	313	89
South Carolina	45	1,840	502	0	1,128	210
South Dakota	8	79	0	0	38	41
Tennessee	58	2,623	734	153	1,356	380
Texas	142	7,779	1,547	35	3,492	2,705
Utah	15	408	82	0	295	31
Vermont	2	128	71	0	57	0
Virgin Islands	1	0	0	0	0	0
Virginia	71	2,881	397	15	2,276	193
Washington	21	12,183	6,113	122	5,455	493
West Virginia	15	677	100	6	436	135
Wisconsin	34	2,006	150	29	1,474	353
Wyoming	2	54	0	0	52	2
American Samoa	1	0	0	0	0	0
Guam	1	0	0	0	0	0
Mariana Islands	1	0	0	0	0	0

¹Intermittent peritoneal dialysis.

²Continuous ambulatory peritoneal dialysis.

³Continuous cycling peritoneal dialysis.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the End Stage Renal Disease Facility Survey, 1991.

Table 29
Kidney transplant activity during the calendar year: 1991

Category	Number	Percentage
Transplants performed at center	10,026	100.0
Living-related donor	2,296	22.9
Living-unrelated donor	86	0.9
Cadaveric donor	7,644	76.2
Patients awaiting transplant	18,234	100.0
Dialysis	17,016	93.3
Nondialysis	1,218	6.7
Patients who received transplant at center	10,011	—
Medicare status	10,011	100.0
Medicare	8,465	84.6
Medicare pending	732	7.3
Non-Medicare	814	8.1
U.S. resident	663	6.6
Other	151	1.5

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the End Stage Renal Disease Facility Survey, 1991.

Table 30
Disposition of cadaveric kidneys, by source: 1991

Source	Total	Disposition of cadaveric kidneys			
		Transplanted at center	Sent to another center	Sent to foreign center	Nonviable kidneys
Total	10,954	7,794	2,715	3	442
Harvested at center	2,636	1,108	1,338	2	188
Obtained from other transplant hospital	726	550	161	0	15
Obtained from independent organ procurement organization	4,713	4,437	224	0	52
Obtained from non-transplant hospital	2,879	1,699	992	1	187
Non-viable kidneys	442	—	—	—	—
Used for research	184	—	—	—	—
Discarded	258	—	—	—	—

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the End Stage Renal Disease Facility Survey, 1991.

Table 31
Kidney transplant center patient eligibility status, by State: 1991

State	Centers reporting	Total transplant patients	Currently enrolled in Medicare	Medicare application pending	Non-Medicare	
					U.S. resident	Other
Total	228	10,011	8,465	732	663	151
Alabama	2	251	240	7	4	0
Arizona	5	111	85	12	12	2
Arkansas	3	75	68	2	4	1
California	24	1,300	1,064	71	123	42
Colorado	4	105	92	11	2	0
Connecticut	2	94	87	3	1	3
District of Columbia	5	209	174	3	22	10
Florida	7	461	424	11	15	11
Georgia	4	231	182	49	0	0
Hawaii	1	27	24	1	0	2
Illinois	8	344	231	39	67	7
Indiana	2	137	124	12	0	1
Iowa	3	103	74	21	8	0
Kansas	2	74	60	7	6	1
Kentucky	3	162	156	0	6	0
Louisiana	7	172	148	13	8	3
Maine	1	44	41	0	3	0
Maryland	3	120	106	6	8	0
Massachusetts	10	345	256	60	15	14
Michigan	10	401	361	14	25	1
Minnesota	5	364	304	42	14	4
Mississippi	1	24	23	1	0	0
Missouri	9	251	226	18	3	4
Nebraska	3	87	50	0	35	2
Nevada	2	34	29	2	3	0
New Jersey	3	133	127	0	6	0
New Mexico	2	72	66	3	3	0
New York	15	559	494	17	39	9
North Carolina	5	253	246	6	1	0
North Dakota	3	23	22	1	0	0
Ohio	12	524	430	23	68	3
Oklahoma	6	102	87	14	0	1
Oregon	1	116	88	25	3	0
Pennsylvania	11	709	549	72	81	7
Puerto Rico	1	36	35	0	1	0
South Carolina	1	89	89	0	0	0
Tennessee	8	260	205	34	18	3
Texas	17	682	594	49	20	19
Utah	2	142	94	46	2	0
Vermont	1	15	14	1	0	0
Virginia	4	161	140	0	21	0
Washington	5	238	216	13	9	0
West Virginia	2	34	32	1	1	0
Wisconsin	3	337	308	22	6	1

NOTE: The following States have no Medicare-approved transplant centers: Alaska, Delaware, Idaho, Montana, New Hampshire, Rhode Island, South Dakota, Wyoming, American Samoa, Guam, Virgin Islands, and Mariana Islands.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the End Stage Renal Disease Facility Survey, 1991.

Table 32
Number of kidney transplants performed and type of donor, by State: 1991

State	Centers reporting	Total patients	Total transplants	Living-related		Living-unrelated		Cadaveric	
				Total	Percent	Total	Percent	Total	Percent
Total	228	10,011	10,026	2,296	22.9	86	0.9	7,644	76.2
Alabama	2	251	251	63	25.1	0	0.0	188	74.9
Arizona	5	111	113	22	19.5	0	0.0	91	80.5
Arkansas	3	75	75	26	34.7	0	0.0	49	65.3
California	24	1300	1302	244	18.7	9	0.7	1049	80.6
Colorado	4	105	105	10	9.5	0	0.0	95	90.5
Connecticut	2	94	94	15	16.0	0	0.0	79	84.0
District of Columbia	5	209	209	53	25.4	8	3.8	148	70.8
Florida	7	461	466	88	18.9	2	0.4	376	80.7
Georgia	4	231	232	75	32.3	3	1.3	154	66.4
Hawaii	1	27	27	5	18.5	0	0.0	22	81.5
Illinois	8	344	344	76	22.1	0	0.0	268	77.9
Indiana	2	137	137	32	23.4	2	1.5	103	75.2
Iowa	3	103	103	22	21.4	0	0.0	81	78.6
Kansas	2	74	74	13	17.6	1	1.4	60	81.1
Kentucky	3	162	162	35	21.6	0	0.0	127	78.4
Louisiana	7	172	172	44	25.6	0	0.0	128	74.4
Maine	1	44	44	6	13.6	0	0.0	38	86.4
Maryland	3	120	120	18	15	1	0.8	101	84.2
Massachusetts	10	345	345	104	30.1	2	0.6	239	69.3
Michigan	10	401	402	116	28.9	6	1.5	280	69.7
Minnesota	5	364	365	148	40.5	7	1.9	210	57.5
Mississippi	1	24	24	0	0.0	0	0.0	24	100.0
Missouri	9	251	251	70	27.9	5	2.0	176	70.1
Nebraska	3	87	87	8	9.2	1	1.1	78	89.7
Nevada	2	34	34	5	14.7	0	0.0	29	85.3
New Jersey	3	133	133	13	9.8	0	0.0	120	90.2
New Mexico	2	72	72	7	9.7	0	0.0	65	90.3
New York	15	559	559	134	24.0	6	1.1	419	75.0
North Carolina	5	253	253	88	34.8	2	0.8	163	64.4
North Dakota	3	23	23	7	30.4	1	4.3	15	65.2
Ohio	12	524	524	99	18.9	2	0.4	423	80.7
Oklahoma	6	102	102	35	34.3	0	0.0	67	65.7
Oregon	1	116	116	32	27.6	0	0.0	84	72.4
Pennsylvania	11	709	709	114	16.1	6	0.8	589	83.1
Puerto Rico	1	36	36	24	66.7	3	8.3	9	25.0
South Carolina	1	89	89	12	13.5	0	0.0	77	86.5
Tennessee	8	260	260	75	28.8	2	0.8	183	70.4
Texas	17	682	683	152	22.3	8	1.2	523	76.6
Utah	2	142	143	47	32.9	0	0.0	96	67.1
Vermont	1	15	15	4	26.7	0	0.0	11	73.3
Virginia	4	161	161	18	11.2	2	1.2	141	87.6
Washington	5	238	238	55	23.1	0	0.0	183	76.9
West Virginia	2	34	34	10	29.4	0	0.0	24	70.6
Wisconsin	3	337	338	72	21.3	7	2.1	259	76.6

NOTE: Percents may not add to total because of rounding. The following States have no Medicare-approved kidney transplant centers: Alaska, Delaware, Idaho, Montana, New Hampshire, Rhode Island, South Dakota, Wyoming, American Samoa, Guam, Virgin Islands and Mariana Islands.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the End Stage Renal Disease Facility Survey, 1991.

Table 33
Distribution of kidney transplants and number of transplants, by State: 1991

State	Centers reporting	Total transplants	0-15		16-50		51-100		101-200		201 or more	
			Total	Percent	Total	Percent	Total	Percent	Total	Percent	Total	Percent
Total	228	10,026	59	25.9	97	42.5	53	23.2	13	5.7	6	2.6
Alabama	2	251	1	50.0	0	0.0	0	0.0	0	0.0	1	50.0
Arizona	5	113	3	60.0	1	20.0	1	20.0	0	0.0	0	0.0
Arkansas	3	75	1	33.3	1	33.3	1	33.3	0	0.0	0	0.0
California	24	1,302	4	16.7	15	62.5	0	0.0	3	12.5	2	8.3
Colorado	4	105	1	25.0	3	75.0	0	0.0	0	0.0	0	0.0
Connecticut	2	94	0	0.0	1	50.0	1	50.0	0	0.0	0	0.0
District of Columbia	5	209	3	60.0	1	20.0	0	0.0	1	20.0	0	0.0
Florida	7	466	1	14.3	2	28.6	2	28.6	2	28.6	0	0.0
Georgia	4	232	0	0.0	2	50.0	2	50.0	0	0.0	0	0.0
Hawaii	1	27	0	0.0	1	100.0	0	0.0	0	0.0	0	0.0
Illinois	8	344	3	37.5	2	25.0	3	37.5	0	0.0	0	0.0
Indiana	2	137	0	0.0	1	50.0	1	50.0	0	0.0	0	0.0
Iowa	3	103	2	66.7	0	0.0	1	33.3	0	0.0	0	0.0
Kansas	2	74	0	0.0	2	100.0	0	0.0	0	0.0	0	0.0
Kentucky	3	162	1	33.3	0	0.0	2	66.7	0	0.0	0	0.0
Louisiana	7	172	2	28.6	5	71.4	0	0.0	0	0.0	0	0.0
Maine	1	44	0	0.0	1	100.0	0	0.0	0	0.0	0	0.0
Maryland	3	120	0	0.0	2	66.7	1	33.3	0	0.0	0	0.0
Massachusetts	10	345	1	10.0	6	60.0	3	30.0	0	0.0	0	0.0
Michigan	10	402	3	30.0	3	30.0	3	30.0	1	10.0	0	0.0
Minnesota	5	365	2	40.0	0	0.0	2	40.0	0	0.0	1	20.0
Mississippi	1	24	0	0.0	1	100.0	0	0.0	0	0.0	0	0.0
Missouri	9	251	4	44.4	3	33.3	2	22.2	0	0.0	0	0.0
Nebraska	3	87	2	66.7	0	0.0	1	33.3	0	0.0	0	0.0
Nevada	2	34	1	50.0	1	50.0	0	0.0	0	0.0	0	0.0
New Jersey	3	133	0	0.0	2	66.7	1	33.3	0	0.0	0	0.0
New Mexico	2	72	0	0.0	2	100.0	0	0.0	0	0.0	0	0.0
New York	15	559	4	26.7	5	33.3	6	40.0	0	0.0	0	0.0
North Carolina	5	253	0	0.0	3	60.0	2	40.0	0	0.0	0	0.0
North Dakota	3	23	3	100.0	0	0.0	0	0.0	0	0.0	0	0.0
Ohio	12	524	3	25.0	7	58.3	1	8.3	0	0.0	1	8.3
Oklahoma	6	102	2	33.3	4	66.7	0	0.0	0	0.0	0	0.0
Oregon	1	116	0	0.0	0	0.0	0	0.0	1	100.0	0	0.0
Pennsylvania	11	709	1	9.1	3	27.3	5	45.5	2	18.2	0	0.0
Puerto Rico	1	36	0	0.0	1	100.0	0	0.0	0	0.0	0	0.0
South Carolina	1	89	0	0.0	0	0.0	1	100.0	0	0.0	0	0.0
Tennessee	8	260	2	25.0	4	50.0	2	25.0	0	0.0	0	0.0
Texas	17	683	5	29.4	7	41.2	3	17.6	2	11.8	0	0.0
Utah	2	143	0	0.0	0	0.0	2	100.0	0	0.0	0	0.0
Vermont	1	15	1	100.0	0	0.0	0	0.0	0	0.0	0	0.0
Virginia	4	161	0	0.0	2	50.0	2	50.0	0	0.0	0	0.0
Washington	5	238	1	20.0	2	40.0	2	40.0	0	0.0	0	0.0
West Virginia	2	34	1	50.0	1	50.0	0	0.0	0	0.0	0	0.0
Wisconsin	3	338	1	33.3	0	0.0	0	0.0	1	33.3	1	33.3

NOTE: Percentages may not add to 100% due to rounding. The following States have no Medicare-approved kidney transplant centers: Alaska, Delaware, Idaho, Montana, New Hampshire, Rhode Island, South Dakota, Wyoming, American Samoa, Guam, Virgin Islands, and Mariana Islands.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the End Stage Renal Disease Facility Survey, 1991.

Table 34
Dialysis patients by profit and nonprofit providers, by State: 1991

State	Total Dialysis Patients	Hospital dialysis facility		Independent dialysis facility	
		Profit	Nonprofit	Profit	Nonprofit
Total	142,488	641	45,622	79,324	16,901
Alabama	3,012	0	359	2,325	328
Alaska	76	0	0	0	76
Arizona	2,186	0	117	1,438	631
Arkansas	1,183	0	311	830	42
California	16,416	0	2,977	11,671	1,768
Colorado	1,237	0	281	956	0
Connecticut	1,748	0	1,134	614	0
Delaware	451	11	0	440	0
District of Columbia	1,276	0	324	878	74
Florida	7,858	54	654	6,068	1,082
Georgia	4,690	0	653	3,395	642
Hawaii	834	0	529	305	0
Idaho	247	0	237	0	10
Illinois	6,588	0	2,390	4,124	74
Indiana	2,908	0	1,708	1,200	0
Iowa	1,001	0	678	209	114
Kansas	1,012	0	93	837	82
Kentucky	1,599	0	266	852	481
Louisiana	3,383	0	437	2,917	29
Maine	317	0	117	200	0
Maryland	3,172	0	722	2,057	393
Massachusetts	2,705	0	1,173	1,358	174
Michigan	4,907	0	2,524	1,457	926
Minnesota	1,715	0	1,204	0	511
Mississippi	2,072	0	183	606	1,283
Missouri	2,829	32	859	1,016	922
Montana	306	0	288	0	18
Nebraska	619	0	459	95	65
Nevada	508	0	116	392	0
New Hampshire	357	0	147	210	0
New Jersey	5,043	62	3,841	1,083	57
New Mexico	902	122	250	436	94
New York	11,541	0	6,977	2,976	1,588
North Carolina	4,466	0	332	4,071	63
North Dakota	260	11	249	0	0
Ohio	5,340	116	3,011	1,174	1,039
Oklahoma	1,335	0	742	593	0
Oregon	1,187	0	791	396	0
Pennsylvania	7,449	35	2,293	4,322	799
Puerto Rico	1,926	0	439	1,487	0
Rhode Island	600	0	28	486	86
South Carolina	2,600	0	26	2,191	383
South Dakota	211	0	211	0	0
Tennessee	3,119	0	493	1,483	1,143
Texas	10,334	140	1,185	8,507	502
Utah	432	19	181	106	126
Vermont	127	0	127	0	0
Virgin Islands	31	0	31	0	0
Virginia	3,690	0	869	2,754	67
Washington	1,909	0	867	0	1,042
West Virginia	797	39	345	246	167
Wisconsin	1,793	0	1,283	510	0
Wyoming	53	0	0	53	0
American Samoa	28	0	28	0	0
Guam	83	0	83	0	0
Mariana Islands	20	0	0	0	20

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from End Stage Renal Disease Facility Survey, 1991

Table 35
Dialysis patients receiving care by type of facility: 1982-91¹

Year	Total Patients	Independent dialysis facility				Hospital dialysis facility			
		Outpatients	Percent Change	Home Patients	Percent Change	Outpatients	Percent Change	Home Patients	Percent Change
1982	65,765	30,413	—	3,805	—	23,619	—	7,928	—
1983	71,987	35,001	15.1	5,162	35.7	23,341	-1.8	8,483	7.0
1984	78,483	39,015	11.5	6,067	17.5	24,230	3.8	9,171	8.1
1985	84,797	42,921	10.0	6,896	13.7	25,473	5.1	9,507	3.7
1986	90,886	47,435	10.5	7,467	8.3	26,365	3.5	9,619	1.2
1987	98,432	52,459	10.6	8,356	11.9	27,690	5.0	9,927	3.2
1988	105,958	58,371	11.3	8,930	6.9	28,824	4.1	9,933	-1.0
1989	116,169	65,643	12.5	10,095	13.0	30,305	5.1	10,126	3.0
1990	129,800	74,377	13.3	11,849	17.4	32,783	8.2	10,791	6.6
1991	142,488	82,690	11.2	13,535	14.2	34,681	5.8	11,582	7.3
Average Annual Percent Change									
1982-91			11.8	—	15.1	—	4.4	—	4.3

¹Counts are as of December 31 of each year from End Stage Renal Disease Facility Surveys.

NOTE: Average annual percent change calculated by use of compounding.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from End Stage Renal Disease Facility Survey, 1982-91

Department of Veterans Affairs dialysis statistics

As of December 31, 1991, there were 84 Department of Veterans Affairs (DVA) dialysis centers providing services to dialysis patients. The statistics displayed in Table 36 include 546 patients (all of whom were on chronic dialysis) who were dialyzing at 12 Medicare-approved Department of Veterans Affairs facilities. Data on the number of continuous ambulatory peritoneal dialysis (CAPD) or continuous cycling peritoneal dialysis (CCPD) patients are not captured as a separate category by the DVA, but are included with other peritoneal dialysis patients.

The data displayed in Table 36 reflect counts taken on December 31 for years 1987 through 1991 and include dialysis center satellite and contract fee dialysis patient counts. The number of DVA dialysis patients decreased 8.6 percent between 1987 and 1991 (3,754 and 3,433, respectively). However, the total number of DVA dialysis patients remained relatively stable since 1989. The number of staff-assisted hemodialysis patients in DVA dialysis centers increased from 1,822 in 1987 to 1,976 in 1991—an increase of 8.5 percent. The number of patients dialyzing at home declined 28.6 percent from 1987 to 1991 (985 and 703, respectively).

Table 36

Number of patients for Department of Veterans Affairs dialysis facilities, by type of dialysis: 1987-91

Type of dialysis	All patients					Percent change 1987-91
	1987	1988	1989	1990	1991	
All modalities	3,754	3,722	3,389	3,293	3,433	-8.6
Staff-assisted	1,864	1,934	1,944	1,924	2,021	8.4
Hemodialysis	1,822	1,889	1,828	1,865	1,976	8.5
Peritoneal dialysis	42	45	116	59	45	7.1
Home	985	860	720	712	703	-28.6
Hemodialysis	442	378	293	259	190	-57.0
Peritoneal dialysis	543	482	427	453	513	-5.5
Contract	597	590	511	427	496	-16.9
Hemodialysis	578	558	487	409	470	-18.7
Peritoneal dialysis	19	32	24	18	26	36.8
Limited	156	121	73	88	78	-50.0
Hemodialysis	154	121	69	84	70	-54.5
Peritoneal dialysis	2	0	4	4	8	300.0
Acute	119	186	123	129	124	4.2
Hemodialysis	117	177	120	123	120	2.6
Peritoneal dialysis	2	9	3	6	4	100.0
In training	33	31	18	13	11	-66.7
Hemodialysis training	23	21	9	5	4	-82.6
Peritoneal dialysis training	10	10	9	8	7	-30.0

SOURCE: Department of Veterans Affairs; Data from the Veterans Health Administration, Medical Service, Office of Clinical Programs, 1987-91.

Survival analyses

Program experience with respect to both patient and graft survival from onset of renal failure, or from date of kidney transplant, to 5 years subsequent is discussed in this section. This analysis covered the period from January 1, 1986 through December 31, 1990. All Medicare beneficiaries with renal failure occurring on or after January 1, 1986 through December 31, 1990 were included in the analysis of dialysis survival. The transplant survival analysis included Medicare beneficiaries whose transplants occurred on or after January 1, 1986 through December 31, 1990. The total number of persons included in the computation of dialysis patient survival was 177,835. The total number of transplants included in the computation of transplant survival was 33,336 (26,506 cadaveric donor transplants and 6,830 living-related donor transplants).¹ Patient and graft survival were tracked through April 30, 1992.

Data

The computation of survival rates for dialysis patients requires a date of renal failure onset along with the date of death or the date of transplantation (if the patient was subsequently transplanted). Computation of survival rates for transplant patients requires the date of transplantation and the date of death (for patient survival) or the date of graft failure (for graft survival). The date of renal failure onset was defined as the date of first dialysis and was taken from the patients' medical evidence records (HCFA-2728) or the outpatient dialysis records (HCFA-1450). In the absence of these records, the date of renal failure onset was estimated from the entitlement records. The date of death was obtained from the Master Beneficiary Records that are maintained for all Medicare beneficiaries. The date of transplant was obtained from the transplant form (HCFA-2745) or from the inpatient hospital bill (HCFA-1450). The date of transplant failure was either obtained from the transplant follow-up form, calculated based on a record of outpatient dialysis sessions, or based on the date of a subsequent transplant.

Survival rates were calculated using a standard actuarial modified life-table analysis. For dialysis patients, survival was measured beginning 90 days following the date of renal failure onset until death, with

right censoring² for transplantation or the end of the observation period (April 30, 1992). The 90 day lag in calculation of the start date was included to avoid the potential bias of excluding persons who died during the interval between renal failure and Medicare entitlement. For transplants, patient survival was measured from the date of transplantation until death, with right censoring for the end of the observation period. Graft survival for transplants was measured from the date of transplantation until graft failure date or date of death, with right censoring for the end of the observation period.

Because it has been found that there are significant age differences among the population subgroups (for example, white persons on dialysis are generally older than black persons on dialysis and persons whose renal failure is due to hypertension are generally older than persons whose renal failure is due to diabetes), the survival rates for each sex, race, and primary diagnostic subgroup were age-adjusted to the age distribution for all persons in each table. For example, survival rates for males and females on dialysis were age-adjusted to the age distribution for all persons on dialysis. Individual survival rates among cadaveric donor transplants were age-adjusted to all cadaveric donor transplants, and individual survival rates among living-related donor transplants were age-adjusted to all living-related donor transplants. Therefore, survival differences among population subgroups due to age differences were largely eliminated.

Results

The results of the analysis of dialysis patient survival are presented in Table 37. At 1 year from the 90 day offset following renal failure onset, 78.2 percent of patients were still alive. At 3 years this had decreased to 50.6 percent and at 5 years to 34.4 percent. There were notable differences by age group. The two groups comprised of persons less than 25 years of age at the time of renal failure had similar 1-year survival rates of 94.0 percent for persons under 15 years of age, and 94.9 percent for persons 15 to 24 years of age. These two groups maintained the highest survival rates across the 5 year span. In year 5, post renal failure, persons under 15 years of age had the highest survival rate of all age groups at 81.3 percent. The rate of survival decreased for each older age cohort. For those over 75 years of age, the 1-year survival rate, was only 60.9 percent; slightly more than one-quarter (25.9 percent) survived 3 years; and only 11.2 percent survived 5 years on dialysis after renal failure. At the end of 1 year, the survival rate for females was 1.9 percent greater than the rate for males (79.2 percent and 77.3 percent, respectively). At 3 years, females had a cumulative survival rate that was 3.4 percentage points greater than the survival rate for males (52.4 percent and 49.0 percent, respectively). At the end of the fifth year, the survival rate for female dialysis patients was

¹The HCFA transplant reporting form (HCFA-2745) does not distinguish between living-related and living-unrelated donors. Depending upon specific reporting procedures at the transplant hospitals, living-unrelated donors may be included in the living-related category or the cadaveric category. Given the small number of such cases, it is expected that the outcome of the analyses will not be affected to any great extent.

²Right censoring is a technique for handling cases in which the person is still alive at the end of the observation period. The life table calculation stops at the right censor date for these persons. However, unlike a withdrawal because of death, there is no increment to the number of deaths.

2.5 percentage points greater than the rate for males (35.7 percent and 33.2 percent, respectively). By racial group, the highest survival rates for dialysis patients after 1 year were found among Asians (84.0 percent), black persons (81.8 percent), and American Indians (81.7 percent). White persons had the lowest 1 year survival rate at 76.5 percent. For all 5 years, Asian persons maintained the highest survival rates, while the survival rate for white persons remained the lowest. The 1 year survival rate for Asian persons exceeded the rate for white persons by 7.5 percentage points (84.0 percent and 76.5 percent, respectively) and by 14.3 percent in year 5 (45.4 percent and 31.1 percent, respectively). In terms of the reported cause of renal failure (i.e., the primary diagnosis) for dialysis patients, the lowest survival rates were found among those patients with diabetes. At 1 year, the survival rate for the diabetic group (74.7 percent) was 2.9 percentage points lower than the next lowest group—those for whom renal failure was attributed to obstructive nephropathy (77.6 percent). By year 5, the survival rate for the diabetic group had decreased to 23.6 percent and was 15.2 percentage points lower than the next lowest group, which was persons whose renal failure was attributed to hypertension, for whom the 5-year survival rate was 38.8 percent. The highest survival rate for year 5 was found for those patients with polycystic kidney disease (52.5 percent). The 5-year survival rate for those with glomerulonephritis was 43.3 percent; for those with interstitial nephritis it was 42.4 percent; and for those with obstructive nephropathy it was 41.1 percent.

Patient survival rates for persons with cadaver donor transplants and living-related donor transplants are presented in Tables 38 and 39, respectively. Among cadaver donor transplant patients, survival rates were 92.4 percent at 1 year, 85.2 percent at 3 years, and 77.1 percent at 5 years. The data show that the likelihood of patient survival decreased with advancing age. The 3-year survival rate was 91.6 percent for persons under 15 years of age and 93.5 percent for persons 15 to 24 years of age, falling to 72.5 percent for persons 65 to 74 years of age. The 5-year survival rate for cadaver donor transplant patients was 90.7 percent for persons under 15 years of age and 90.3 percent for those 15 to 24 years of age, decreasing to 57.6 percent for persons 65 to 74 years of age. Females had a higher survival rate than did males after a cadaver donor transplant. At year 1, the female survival rate (93.0 percent) exceeded the male survival rate (92.0 percent) by 1.0 percentage point. By year 5, the female survival rate (79.6 percent) exceeded the male survival rate (75.7 percent) by 3.9 percentage points. The three year survival rates for cadaver donor transplant patients ranged from a high of 86.8 percent for Asian persons to a low of 83.3 percent for American Indians. By year 5 post transplant, American Indians experienced the highest survival rate (82.5 percent). The lowest survival rate at 5 years was experienced by black persons (75.5 percent). In terms of the reported cause of renal failure for cadaver donor transplants, the lowest survival rates across the 5 years reported were found for those patients with diabetes. At year 1, the survival rate for the

diabetic group (89.8 percent) was 1.9 percentage points lower than the next lowest group which was those for whom renal failure was attributed to obstructive nephropathy (91.7 percent). By year 5, the survival rate for the diabetic group had declined to 66.7 percent. This was 10.0 percentage points lower than the next lowest category, the hypertension group, which had a survival rate of 76.7 percent. The highest 5-year survival rate was experienced by persons whose renal failure was attributed to polycystic kidney disease (86.5 percent). Eighty-five percent of all cadaver transplants between 1986 and 1990 were first transplants. Patient survival was higher for first transplants than for subsequent transplants at 5 years post transplant (77.4 percent and 75.1 percent, respectively).

The data in Table 39 indicate that, among living-related donor transplant patients, the survival rate for year 1 was 96.8 percent, for year 3 was 93.1 percent, and for year 5 was 88.7 percent. As with cadaver donor recipients, survival for living-related donor transplant patients decreased with age. At year 1, all age groups, with the exception of the 65-74 years of age group, had survival rates that exceeded 90 percent. At year 3, the survival rate for those people under 45 years of age still exceeded 93 percent; the rate for those 45 years of age and over was under 90 percent. Finally, in year 5, the survival rate for those under 35 years of age continued to be higher than 90 percent (about 93 percent), while the rate for all others was under 90 percent. The first 5 year survival rate for those persons between 65 and 74 years of age was 57.3 percent. The survival rates for females was comparable to that for males, across the 5 years. The largest difference occurred in year 4, when the female rate (90.6 percent) was 1.4 percentage points lower than the male rate (92.0 percent). At year 5, the survival rate for Asian persons was 94.0 percent, followed by white persons at 89.4 percent, American Indians at 86.2 percent, and black persons at 85.3 percent. As with cadaver donor transplants, the survival rate for living-related donor transplant patients was generally lower for persons for whom diabetes was found to be the primary cause of renal failure. By year 5, the survival rate for the diabetic group (84.9 percent) was 2.7 percentage points lower than the rate for the next lower group—the hypertensive group (87.6 percent). Living-related donor transplants as subsequent transplants were fairly unusual and accounted for only 6.6 percent of living-related donor transplants. Patient survival at 5 years was lower (85.4 percent) for subsequent living-related donor transplants than for first living-related donor transplants (88.9 percent).

Kidney graft survival rates for cadaveric transplants and living-related donor transplants are presented in Tables 40 and 41, respectively. Among cadaver donor transplants, 78.4 percent of the kidney grafts survived for at least 1 year; 66.0 percent survived 3 years; and 55.8 percent were still functioning at year 5. Those persons in the 65-74 years of age group experienced the lowest graft survival rates in cadaver donor transplants (73.0 percent in year 1, decreasing to 51.1 percent in year 5). Graft survival was relatively consistent for the 25 through 64 years of age groups. At year 1, graft

survival rates for males and females were about the same. However, by year 5, the female survival rate (57.0 percent) exceeded the male survival rate (54.6 percent) by 2.4 percentage points. Asian persons experienced the highest cadaver donor graft survival rates for all years except for year 5 when American Indians had a slightly higher graft survival (60.3 percent and 60.9, respectively). By year 5, white persons had a graft survival rate of 58.8 percent, followed by black persons at 44.1 percent. By reported cause of renal failure, the lowest 3-year graft survival rate for cadaver donor transplants was found among those people for whom the primary cause of renal failure was attributed to hypertension (58.6 percent). The highest 3 year survival rates were found for those persons with polycystic kidney disease (72.8 percent), obstructive nephropathy (69.8 percent), and interstitial nephritis (69.3 percent). By year 5, the survival rate for the hypertensive group had declined to 45.3 percent, still the lowest survival rate. The highest 5 year cadaver donor graft survival rate was found for persons with a primary diagnosis of polycystic kidney disease (64.4 percent), followed by interstitial nephritis (63.7 percent) and obstructive nephropathy (63.3 percent). First cadaver transplants had a higher first year graft survival rate than subsequent cadaver transplants (79.0 percent and 71.2 percent, respectively). At 5 years post transplant, graft survival was 56.3 percent for first cadaver transplants and 50.2 percent for subsequent cadaver transplants.

Among living-related donor transplants (Table 41), 89.4 percent of the kidney grafts survived to year 1; 82.0 percent survived to year 3; and 74.4 percent survived to year 5. At year 1, graft survival ranged between 84.0 percent (65 to 74 years of age group) and 90.5 percent (15 to 24 years of age group). By year 5,

these rates had decreased to a range between 55.1 percent for persons 65 to 74 years of age and 77.2 percent for persons 35 to 44 years of age. Graft survival rates were similar for males and females at each of the 5 year periods. One year graft survival for living-related donor transplant was highest for American Indians (94.7 percent) and Asians (91.4 percent) and was lowest for black persons (86.4 percent). The highest 5-year survival rate was found for Asian persons (83.5 percent) followed by white persons (76.7 percent), American Indians (70.0 percent), and black persons (60.8 percent).

By primary diagnosis category, the 1- and 5-year graft survival rates for living-related donor transplants were, as with cadaver grafts, lowest for persons whose renal failure was attributed to hypertension (87.3 percent and 63.7 percent, respectively). The highest 3-year graft survival rates were found for those persons with a primary diagnosis of obstructive nephropathy (90.3 percent) and those with polycystic kidney disease (85.4 percent). The highest 5-year graft survival rates were found for those persons with obstructive nephropathy (81.8 percent) and polycystic kidney disease (81.7 percent).

The difference in graft survival rates for living-related donor transplants between first and subsequent transplants increased over the 5 years reported. The one year graft survival rate was 5.4 percentage points higher for first living-related donor transplants than for subsequent living-related donor transplants (89.6 percent and 84.2 percent, respectively). At five years, 74.8 percent of first living-related donor grafts were functioning, compared to 67.8 percent of subsequent living-related donor grafts, a difference of 7.0 percentage points.

Table 37
Dialysis patient survival, by age, sex, race, and primary diagnosis: 1986-90

Age, sex, race, and primary diagnosis	Total	Percent surviving				
		1 year	2 years	3 years	4 years	5 years
All persons	177,835	78.2 (0.1)	62.7 (0.1)	50.6 (0.2)	41.3 (0.2)	34.4 (0.2)
Age						
Under 15 years	1,873	94.0 (0.6)	89.8 (1.0)	86.1 (1.4)	82.4 (2.0)	81.3 (2.3)
15 - 24 years	5,614	94.9 (0.3)	90.4 (0.5)	85.2 (0.7)	81.2 (1.0)	78.0 (1.3)
25 - 34 years	14,606	90.2 (0.3)	80.6 (0.4)	72.7 (0.5)	65.5 (0.7)	59.5 (0.9)
35 - 44 years	20,651	88.6 (0.2)	77.8 (0.3)	68.4 (0.4)	60.0 (0.6)	53.1 (0.7)
45 - 54 years	25,550	86.2 (0.2)	72.9 (0.3)	61.2 (0.4)	51.6 (0.5)	44.0 (0.6)
55 - 64 years	39,747	79.1 (0.2)	63.0 (0.3)	49.8 (0.3)	39.3 (0.3)	31.5 (0.4)
65 - 74 years	44,929	70.9 (0.2)	52.0 (0.3)	37.8 (0.3)	27.5 (0.3)	20.1 (0.3)
75 years or over	24,865	60.9 (0.3)	39.5 (0.3)	25.9 (0.3)	17.1 (0.3)	11.2 (0.3)
Sex						
Male	96,539	77.3 (0.1)	61.5 (0.2)	49.0 (0.2)	39.9 (0.2)	33.2 (0.3)
Female	81,296	79.2 (0.2)	64.1 (0.2)	52.4 (0.2)	42.9 (0.2)	35.7 (0.3)
Race						
Asian	3,365	84.0 (0.7)	70.6 (0.9)	58.9 (1.1)	51.1 (1.3)	45.4 (1.6)
Black	51,974	81.8 (0.2)	68.0 (0.2)	56.7 (0.3)	47.2 (0.3)	39.6 (0.4)
White	117,484	76.5 (0.1)	60.0 (0.2)	47.4 (0.2)	37.9 (0.2)	31.1 (0.2)
American Indian	2,141	81.7 (0.8)	65.2 (1.1)	52.0 (1.4)	43.6 (1.5)	36.3 (1.9)
Other/Unknown	2,871	79.4 (0.7)	64.7 (0.9)	52.2 (1.1)	43.3 (1.3)	37.5 (1.5)
Primary diagnosis						
Diabetes	56,913	74.7 (0.2)	55.2 (0.2)	41.1 (0.3)	30.6 (0.3)	23.6 (0.3)
Glomerulonephritis	24,397	83.9 (0.2)	71.1 (0.3)	59.8 (0.4)	50.7 (0.5)	43.3 (0.6)
Hypertension	47,546	80.0 (0.2)	66.2 (0.2)	55.1 (0.3)	46.2 (0.3)	38.8 (0.4)
Polycystic kidney disease	6,018	89.8 (0.4)	79.8 (0.6)	69.7 (0.8)	59.4 (1.0)	52.5 (1.2)
Interstitial nephritis	6,085	82.4 (0.5)	69.7 (0.7)	59.0 (0.8)	49.8 (0.9)	42.4 (1.0)
Obstructive nephropathy	3,965	77.6 (0.7)	66.2 (0.8)	57.0 (0.9)	49.5 (1.0)	41.1 (1.2)
Other	10,166	69.4 (0.5)	54.5 (0.5)	44.3 (0.6)	36.5 (0.7)	30.8 (0.8)
Unknown	11,126	78.6 (0.4)	64.3 (0.5)	53.0 (0.6)	43.9 (0.6)	37.8 (0.7)
Not reported	11,619	77.6 (0.4)	63.5 (0.5)	51.5 (0.6)	42.9 (0.7)	37.3 (0.8)

NOTES: Numbers in parentheses represent the standard error of the estimate for each value. Rates based on fewer than 30 observations are not displayed. Survival rates for individual sex, race, and primary diagnosis groups were age-adjusted to the age distribution of all dialysis patients.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Program Management and Medical Information System, April 1992 update, 1986-90.

Table 38

Cadaver donor transplant patient survival, by age, sex, race, and primary diagnosis: 1986-90

Age, sex, race, and primary diagnosis	Total	Percent surviving				
		1 year	2 years	3 years	4 years	5 years
All persons	26,506	92.4 (0.2)	88.8 (0.2)	85.2 (0.2)	81.2 (0.3)	77.1 (0.4)
Age						
Under 15 years	756	94.1 (0.9)	92.6 (1.0)	91.6 (1.0)	91.4 (1.1)	90.7 (1.3)
15 - 24 years	2,287	96.5 (0.4)	95.2 (0.5)	93.5 (0.6)	91.8 (0.7)	90.3 (0.9)
25 - 34 years	5,647	95.0 (0.3)	92.5 (0.4)	90.2 (0.4)	86.7 (0.6)	84.0 (0.8)
35 - 44 years	7,378	93.1 (0.3)	89.7 (0.4)	86.2 (0.4)	81.9 (0.6)	77.8 (0.8)
45 - 54 years	5,895	91.0 (0.4)	86.6 (0.5)	82.2 (0.5)	77.5 (0.7)	72.9 (0.9)
55 - 64 years	3,752	88.0 (0.5)	82.3 (0.6)	77.1 (0.8)	72.1 (0.9)	65.3 (1.3)
65 - 74 years	770	84.3 (1.3)	78.9 (1.5)	72.5 (1.8)	64.5 (2.3)	57.6 (3.2)
75 years or over	21	—	—	—	—	—
Sex						
Male	16,293	92.0 (0.2)	88.3 (0.3)	84.4 (0.3)	80.2 (0.4)	75.7 (0.5)
Female	10,213	93.0 (0.3)	89.8 (0.3)	86.6 (0.4)	82.9 (0.5)	79.6 (0.6)
Race						
Asian	661	92.3 (1.0)	89.1 (1.2)	86.8 (1.4)	82.9 (1.8)	78.7 (2.7)
Black	5,985	93.0 (0.3)	88.8 (0.4)	84.6 (0.5)	80.2 (0.6)	75.5 (0.9)
White	19,424	92.2 (0.2)	88.7 (0.2)	85.3 (0.3)	81.3 (0.3)	77.5 (0.5)
American Indian	281	89.6 (1.9)	87.7 (2.1)	83.3 (2.5)	82.5 (2.6)	82.5 (2.6)
Other/Unknown	155	97.9 (0.9)	95.3 (1.5)	94.0 (1.8)	91.2 (3.0)	91.2 (6.0)
Primary diagnosis						
Diabetes	5,433	89.8 (0.4)	83.9 (0.5)	79.1 (0.6)	73.3 (0.8)	66.7 (1.1)
Glomerulonephritis	6,924	93.5 (0.3)	90.8 (0.4)	87.7 (0.4)	84.2 (0.5)	81.2 (0.7)
Hypertension	3,959	93.3 (0.4)	89.8 (0.5)	85.5 (0.7)	81.5 (0.8)	76.7 (1.2)
Polycystic kidney disease	2,261	94.1 (0.5)	92.3 (0.6)	90.7 (0.7)	88.6 (0.9)	86.5 (1.2)
Interstitial nephritis	1,069	94.6 (0.7)	91.1 (0.9)	88.7 (1.0)	86.1 (1.2)	84.3 (1.7)
Obstructive nephropathy	489	91.7 (1.2)	90.5 (1.3)	88.3 (1.4)	85.2 (1.8)	83.3 (2.1)
Other	1,907	91.7 (0.6)	87.5 (0.7)	84.2 (0.8)	81.3 (1.0)	77.7 (1.3)
Unknown	2,031	94.0 (0.5)	90.6 (0.7)	87.3 (0.8)	83.1 (1.0)	80.0 (1.4)
Not reported	2,433	91.4 (0.6)	88.6 (0.7)	85.2 (0.8)	82.0 (0.9)	79.1 (1.3)
Transplant number						
First transplant	22,698	92.6 (0.2)	88.9 (0.2)	85.5 (0.3)	81.5 (0.3)	77.4 (0.4)
Subsequent transplants	3,808	91.4 (0.4)	88.0 (0.5)	83.3 (0.6)	78.8 (0.8)	75.1 (1.1)

NOTES: Numbers in parentheses represent the standard error of the estimate for each value. Rates based on fewer than 30 observations are not displayed. Survival rates for individual sex, race, and primary diagnosis groups were age-adjusted to the age distribution of all cadaver donor transplant recipients.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Program Management and Medical Information System, April 1992 update, 1986-90.

Table 39

Living-related donor transplant patient survival, by age, sex, race, and primary diagnosis: 1986-90

Age, sex, race, and primary diagnosis	Total	Percent surviving				
		1 year	2 years	3 years	4 years	5 years
All persons	6,830	96.8 (0.2)	94.8 (0.3)	93.1 (0.3)	90.9 (0.4)	88.7 (0.6)
Age						
Under 15 years	655	96.8 (0.7)	96.0 (0.8)	95.1 (0.9)	93.4 (1.2)	93.4 (1.2)
15-24 years	1,233	98.5 (0.3)	97.3 (0.5)	96.8 (0.5)	95.6 (0.7)	95.2 (0.8)
25-34 years	2,077	97.3 (0.4)	95.2 (0.5)	93.7 (0.6)	92.2 (0.7)	91.3 (0.9)
35-44 years	1,548	97.0 (0.4)	95.9 (0.5)	93.8 (0.7)	91.4 (0.9)	87.5 (1.5)
45-54 years	860	95.5 (0.7)	91.6 (1.0)	88.7 (1.2)	85.7 (1.5)	81.6 (2.2)
55-64 years	403	91.6 (1.4)	87.6 (1.7)	84.0 (2.0)	78.9 (2.6)	71.3 (4.0)
65-74 years	50	88.0 (4.6)	83.0 (5.5)	72.2 (7.6)	57.3 (9.7)	57.3 (9.7)
75 years or over	4	—	—	—	—	—
Sex						
Male	4,008	96.7 (0.3)	94.8 (0.4)	93.5 (0.4)	92.0 (0.6)	89.6 (0.7)
Female	2,822	96.8 (0.3)	94.6 (0.4)	93.0 (0.5)	90.6 (0.6)	88.9 (1.0)
Race						
Asian	109	97.2 (1.8)	95.0 (2.3)	94.0 (2.7)	94.0 (2.7)	94.0 (2.7)
Black	808	96.7 (0.6)	93.8 (0.9)	90.9 (1.1)	86.7 (1.6)	85.3 (2.0)
White	5,789	96.7 (0.2)	94.9 (0.3)	93.3 (0.4)	91.5 (0.4)	89.4 (0.6)
American Indian	82	99.4 (1.2)	98.4 (1.8)	96.4 (2.6)	93.2 (4.0)	86.2 (10.8)
Other/unknown	42	100.0 (0.0)	100.0 (0.0)	100.0 (0.0)	95.6 (5.4)	95.6 (5.4)
Primary diagnosis						
Diabetes	1,328	96.3 (0.6)	91.9 (0.8)	89.3 (1.0)	86.6 (1.2)	84.9 (1.5)
Glomerulonephritis	2,058	97.2 (0.4)	96.2 (0.4)	95.2 (0.5)	94.2 (0.6)	92.5 (0.9)
Hypertension	547	95.3 (0.9)	93.8 (1.1)	91.7 (1.5)	89.9 (1.8)	87.6 (2.0)
Polycystic kidney disease	294	99.4 (0.7)	98.6 (1.0)	97.2 (1.5)	96.4 (1.7)	95.6 (3.9)
Interstitial nephritis	323	98.2 (0.8)	97.8 (0.9)	97.5 (1.0)	94.8 (1.7)	93.7 (2.4)
Obstructive nephropathy	202	97.2 (1.2)	96.1 (1.4)	94.9 (1.6)	93.2 (2.4)	93.2 (2.4)
Other	765	97.8 (0.6)	95.8 (0.7)	94.2 (0.9)	90.7 (1.2)	88.5 (1.6)
Unknown	483	96.9 (0.8)	94.6 (1.0)	93.0 (1.2)	90.4 (1.6)	85.4 (2.6)
Not reported	830	96.6 (0.6)	94.5 (0.8)	93.4 (0.9)	91.8 (1.1)	89.4 (1.7)
Transplant number						
First transplant	6,378	96.9 (0.2)	95.0 (0.3)	93.3 (0.3)	91.1 (0.4)	88.9 (0.6)
Subsequent transplants	452	94.2 (0.9)	90.9 (1.3)	87.6 (1.6)	86.3 (1.7)	85.4 (2.1)

NOTES: Numbers in parentheses represent the standard error of the estimate for each value. Rates based on fewer than 30 observations are not displayed. Survival rates for individual sex, race, and primary diagnosis groups were age-adjusted to the age distribution of all living-related donor transplant recipients.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Program Management and Medical Information System, April 1992 update, 1986-90.

Table 40

Cadaver donor transplant graft survival of patients, by age, sex, race, and primary diagnosis: 1986-90

Age, sex, race, and primary diagnosis	Percent surviving					
	Total	1 year	2 years	3 years	4 years	5 years
All persons	26,506	78.4 (0.3)	72.0 (0.3)	66.0 (0.3)	60.5 (0.4)	55.8 (0.5)
Age						
Under 15 years	756	77.7 (1.6)	66.1 (1.8)	61.4 (1.9)	57.2 (2.1)	55.7 (2.3)
15-24 years	2,287	82.1 (0.9)	77.3 (1.0)	69.0 (1.1)	61.8 (1.3)	56.0 (1.5)
25-34 years	5,647	78.6 (0.6)	72.3 (0.6)	66.5 (0.7)	60.7 (0.8)	56.6 (1.0)
35-44 years	7,378	78.2 (0.5)	71.6 (0.5)	65.3 (0.6)	60.0 (0.7)	55.4 (0.9)
45-54 years	5,895	78.3 (0.5)	72.0 (0.6)	66.5 (0.7)	61.3 (0.8)	56.9 (1.0)
55-64 years	3,752	77.7 (0.7)	71.0 (0.8)	65.6 (0.8)	60.2 (1.0)	54.3 (1.3)
65-74 years	770	73.0 (1.6)	68.5 (1.7)	62.2 (1.9)	57.2 (2.2)	51.1 (3.1)
75 years or over	21	—	—	—	—	—
Sex						
Male	16,293	77.9 (0.3)	71.0 (0.4)	64.9 (0.4)	59.5 (0.5)	54.6 (0.6)
Female	10,213	77.8 (0.4)	71.7 (0.5)	66.2 (0.5)	60.8 (0.6)	57.0 (0.7)
Race						
Asian	661	80.3 (1.6)	74.7 (1.7)	70.9 (1.9)	66.4 (2.2)	60.3 (3.2)
Black	5,985	75.2 (0.6)	64.5 (0.6)	56.4 (0.7)	49.6 (0.8)	44.1 (1.0)
White	19,424	78.5 (0.3)	73.2 (0.3)	67.8 (0.4)	62.8 (0.4)	58.8 (0.5)
American Indian	281	76.7 (2.5)	70.8 (2.8)	64.2 (3.1)	60.9 (3.4)	60.9 (3.4)
Other/unknown	155	88.7 (2.5)	83.5 (3.0)	79.4 (3.6)	78.3 (3.9)	78.3 (6.2)
Primary diagnosis						
Diabetes	5,433	78.6 (0.6)	71.8 (0.6)	65.8 (0.7)	59.7 (0.8)	53.9 (1.1)
Glomerulonephritis	6,924	78.0 (0.5)	72.3 (0.6)	66.6 (0.6)	61.4 (0.7)	57.6 (0.9)
Hypertension	3,959	76.7 (0.7)	66.9 (0.8)	58.6 (0.9)	52.3 (1.0)	45.3 (1.3)
Polycystic kidney disease	2,261	79.8 (0.9)	75.8 (0.9)	72.8 (1.0)	69.1 (1.1)	64.4 (1.5)
Interstitial nephritis	1,069	80.6 (1.2)	74.1 (1.4)	69.3 (1.5)	64.4 (1.7)	63.7 (2.0)
Obstructive nephropathy	489	78.3 (1.9)	74.5 (2.0)	69.8 (2.2)	66.1 (2.5)	63.3 (2.9)
Other	1,907	76.9 (1.0)	70.3 (1.1)	64.9 (1.2)	60.8 (1.4)	56.0 (1.7)
Unknown	2,031	77.8 (0.9)	69.1 (1.1)	60.4 (1.2)	54.6 (1.3)	52.6 (1.6)
Not reported	2,433	78.7 (0.8)	73.6 (0.9)	68.8 (1.0)	65.8 (1.1)	62.2 (1.4)
Transplant number						
First transplant	22,698	79.0 (0.3)	72.2 (0.3)	66.3 (0.3)	61.0 (0.4)	56.3 (0.5)
Subsequent transplants	3,808	71.2 (0.7)	65.3 (0.8)	59.3 (0.9)	53.3 (1.0)	50.2 (1.2)

NOTES: Numbers in parentheses represent the standard error of the estimate for each value. Rates based on fewer than 30 observations are not displayed. Survival rates for individual sex, race, and primary diagnosis groups were age-adjusted to the age distribution of all cadaver donor transplant recipients.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Program Management and Medical Information System, April 1992 update, 1986-90.

Table 41
Living-related donor transplant graft survival of patients, by age,
sex, race, and primary diagnosis: 1986-90

Age, sex, race, and primary diagnosis	Total	Percent surviving				
		1 year	2 years	3 years	4 years	5 years
All persons	6,830	89.4 (0.4)	85.7 (0.4)	82.0 (0.5)	77.9 (0.6)	74.4 (0.8)
Age						
Under 15 years	655	86.7 (1.3)	83.5 (1.5)	80.0 (1.7)	75.1 (2.0)	71.6 (2.6)
15 - 24 years	1,233	90.5 (0.8)	85.2 (1.0)	80.9 (1.2)	75.9 (1.5)	72.7 (1.8)
25 - 34 years	2,077	90.2 (0.7)	86.1 (0.8)	83.3 (0.9)	80.2 (1.0)	76.0 (1.4)
35 - 44 years	1,548	90.3 (0.8)	88.1 (0.8)	84.3 (1.0)	80.0 (1.3)	77.2 (1.6)
45 - 54 years	860	88.3 (1.1)	84.7 (1.3)	80.4 (1.5)	76.7 (1.7)	73.8 (2.2)
55 - 64 years	403	85.4 (1.8)	82.0 (1.9)	77.9 (2.2)	73.3 (2.7)	68.5 (3.7)
65 - 74 years	50	84.0 (5.2)	80.0 (5.7)	70.0 (6.8)	66.1 (7.5)	55.1 (9.5)
75 years or over	4	—	—	—	—	—
Sex						
Male	4,008	89.0 (0.5)	85.2 (0.6)	81.4 (0.7)	77.3 (0.8)	74.6 (1.0)
Female	2,822	89.8 (0.6)	86.2 (0.7)	82.7 (0.8)	78.6 (0.9)	74.2 (1.3)
Race						
Asian	109	91.4 (2.9)	87.3 (3.4)	86.3 (3.6)	83.5 (4.4)	83.5 (4.4)
Black	808	86.4 (1.2)	79.6 (1.5)	73.8 (1.7)	65.7 (2.2)	60.8 (2.9)
White	5,789	89.7 (0.4)	86.4 (0.5)	83.1 (0.5)	79.6 (0.6)	76.7 (0.8)
American Indian	82	94.7 (2.4)	88.7 (3.5)	85.1 (4.2)	76.0 (6.5)	70.0(11.7)
Other/unknown	42	91.4 (4.5)	89.4 (5.1)	86.2 (6.1)	75.8 (9.3)	68.1(13.5)
Primary diagnosis						
Diabetes	1,328	88.1 (0.9)	83.5 (1.1)	80.0 (1.2)	75.8 (1.4)	73.1 (1.8)
Glomerulonephritis	2,058	89.1 (0.7)	86.3 (0.8)	83.1 (0.9)	78.9 (1.1)	76.6 (1.3)
Hypertension	547	87.3 (1.5)	81.9 (1.6)	74.2 (2.0)	66.7 (2.5)	63.7 (3.0)
Polycystic kidney disease	294	93.2 (1.5)	89.8 (1.8)	85.4 (2.3)	82.5 (2.7)	81.7 (4.0)
Interstitial nephritis	323	87.9 (1.8)	86.4 (1.9)	81.6 (2.3)	77.4 (2.8)	74.5 (4.0)
Obstructive nephropathy	202	93.8 (1.8)	90.3 (2.2)	90.3 (2.2)	83.9 (3.5)	81.8 (4.5)
Other	765	90.0 (1.1)	85.9 (1.3)	83.7 (1.5)	79.8 (1.8)	76.1 (2.4)
Unknown	483	89.3 (1.4)	83.3 (1.7)	79.9 (2.0)	74.9 (2.4)	67.8 (3.5)
Not reported	830	91.9 (0.9)	89.0 (1.1)	86.8 (1.2)	84.8 (1.4)	81.7 (2.0)
Transplant number						
First transplant	6,378	89.6 (0.4)	85.9 (0.4)	82.4 (0.5)	78.2 (0.6)	74.8 (0.8)
Subsequent transplants	452	84.2 (1.7)	80.3 (1.8)	74.4 (2.2)	70.9 (2.5)	67.8 (3.1)

NOTES: Numbers in parentheses represent the standard error of the estimate for each value. Rates based on fewer than 30 observations are not displayed. Survival rates for individual sex, race, and primary diagnosis groups were age-adjusted to the age distribution of all living-related donor transplant recipients.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Program Management and Medical Information System, April 1992 update, 1986-90.

Hospital inpatient utilization

Data

This section presents information about the number of hospital stays, time spent in inpatient status, and average length of stays for Medicare ESRD beneficiaries. Medicare expenditures for inpatient services are presented in the next section, along with expenditures for other services.

The number and duration of hospitalizations billed to HCFA on behalf of Medicare ESRD beneficiaries are shown in Tables 42 through 47. The hospitalization data come from the Medicare Automated Data Retrieval System (MADRS) which contains selected expenditure and medical information for each hospitalization. These hospitalization records were linked with personal identification records from the ESRD Program Management and Medical Information System (PMMIS). The number of hospital discharges and the total number of days hospitalized per year were calculated for each beneficiary.

The analysis was performed for calendar years 1985-90 and includes all people who were alive, Medicare entitled, and ESRD at any time during the observation year. For each calendar year, patients were classified into one of four mutually exclusive treatment groups: (1) patients on dialysis for the entire calendar year (or that part of the year they were alive, Medicare entitled, and ESRD); (2) patients who received a kidney transplant during the year; (3) patients who had a functioning graft the entire part of the year they were alive and entitled; and (4) patients who experienced a graft failure, but did not have a transplantation during that same calendar year.

A qualification on these utilization data concerns the provisions of Medicare as a secondary payer. Beginning in 1981, Medicare became the secondary payer for care for ESRD patients in their first year of Medicare coverage if they have another insurance carrier and if they are entitled to Medicare solely because of ESRD (i.e., not because of disability and not because they are 65 years of age or over). In 1990, this was extended to 18 months. The extent of coverage of, and payment for, services by other payers is not well known because Medicare may not receive copies of bills for these services.

Table 42 includes Medicare secondary payer (MSP) beneficiaries since the purpose is to show total Medicare covered hospitalizations.

However, the per patient data in Tables 43 to 47 exclude Medicare secondary payer beneficiaries, and all persons who were potentially Medicare secondary payer beneficiaries, so that these tables may be used to show the amounts of services used on average by ESRD patients. In order to reduce biases due to MSP, persons under 65 years of age must have had ESRD for at least one year prior to January 1 of the observation year to be included in these tables.

Results

Table 42 shows the total Medicare covered hospitalization experience of the Medicare ESRD population from 1985 through 1990. The number of Medicare covered hospitalizations increased from 183,500 in 1985 to 283,300 in 1990, an average annual increase of 9.1 percent. During this same time, the total number of inpatient days increased from 1,697,900 to 2,87,400, an average annual increase of 11.1 percent. The higher rate of increase in hospitalized days (11.1 percent) compared to hospitalizations (9.1 percent) was due to an increase in average length of stay, from 9.3 days in 1985 to 10.2 days in 1990. In 1990, dialysis patients accounted for 83.5 percent of all hospitalizations among ESRD beneficiaries (236,600). Transplant recipients and functioning graft patients each accounted for 7.3 percent of hospitalizations (20,700 and 20,800, respectively) while graft failure patients accounted for 1.8 percent of hospitalizations (5,200).

Table 43 shows hospitalization rates (discharges per person and hospital days per person) by patient treatment group. Excluded from Table 43 are persons for whom Medicare was the secondary payer as well as persons for whom Medicare may have been the secondary payer. Overall, hospitalization rates remained fairly constant over this 6 year period at about 1.5 to 1.6 hospitalizations per person. The average number of hospitalized days per person increased from 14.8 in 1985 to 16.1 in 1990. Dialysis patients spent an average of 18.1 days in the hospital in 1990, greater than the 1985 rate of 15.3 days. The average length of stay for dialysis patients increased from 9.3 days in 1985 to 10.6 days in 1990. Transplant recipients were hospitalized an average of 2.7 times in 1990, down slightly from 2.8 in 1985. However, total days spent in the hospital declined by 2.8 days for transplant recipients, from 33.3 days to 30.5 days in 1985 and 1990, respectively. Persons with a functioning kidney graft had the lowest overall hospitalization rates. In 1990 they were hospitalized an average of 0.7 times per person, down slightly from 0.8 times in 1985, and representing an average annual decrease of 3.3 percent. The total hospitalized days per functioning graft patient also declined, from 6.5 days in 1985 to 5.7 days in 1990. Those persons whose grafts failed experienced the highest hospitalization rates. In each of the years shown, these persons averaged about 3 hospitalizations per person. The average length of stay remained constant from 1985 through 1990 (9.2 and 9.4 days respectively). Consequently, the total hospitalized days also remained constant from 1985 to 1990 (26.4 and 26.8 days, respectively).

Per capita discharges and inpatient days during 1990 by age, sex, race, and primary diagnosis for renal failure are shown in Tables 44 through 47. There is a separate table

for each of the four treatment groups: dialysis, transplant, functioning graft, and graft failure. To examine utilization, it is necessary to adjust for varying lengths of entitlement periods for patients during the year. That is, the data must be annualized for patients who become ESRD during the year and those who die during the year, because their records would not reflect a full year's utilization. For this reason, Tables 44 through 47 display both unadjusted and annualized data for the average number of days during the year that people in each group were ESRD and Medicare entitled. The annualized values are estimated by a linear extrapolation of the basic per capita figures to a full year (365 days) of coverage. Annualization is most important for the age groups and primary diagnosis classifications since, in general, older people and persons with diabetes have the fewest numbers of days at risk. Unless otherwise stated, and except for average lengths of stay, all results are based on annualized values.

Inpatient utilization for dialysis patients during 1990 is shown in Table 44. The number of days hospitalized and the average length of stay during the year increased with age. For example, average length of stay increased from 7.1 days per stay for patients in the 15-24 years of age group to 12.2 for those over 75 years of age. On average, women were hospitalized slightly more often than were men (2.2 and 2.0 discharges, respectively). Women also experienced 3.6 more inpatient days per year per person than did men (24.4 and 20.8, respectively). The lowest hospitalization rates were experienced by Asians (1.4 discharges per person) and the highest by American Indians at 2.5 discharges per person. Black, white, and American Indian beneficiaries averaged between 20 and 24 hospital days per person in 1990. Asians had about one-third fewer hospital days at 14.6. Patients with diabetes experienced the highest annualized average of hospitalization for the year at 2.7 discharges. The lowest average number of hospitalizations was for those persons with polycystic kidney disease at 1.6 discharges. These two groups also experienced the highest number of hospital days per patient for the year (31.8 days for diabetes) and the lowest (14.0 days for polycystic kidney disease).

Table 45 shows hospitalization rates by demographic group for transplant recipients. There was less age effect on hospitalization rates among transplant recipients than among dialysis patients (see Table 44). Transplant patients had the highest number of inpatient days (31.7 days) and days per stay (11.1 days) of any treatment group. Patients under 15 years of age had the highest number of discharges per patient (3.8 discharges) and the highest number of days per patient (44.3 days). There were no major differences in utilization between males and females. American Indians were hospitalized more often

(3.5 discharges) and for more days per year (35.7 days) than other racial groups. Asian persons had the lowest utilization in these categories with 2.2 discharges and 26.4 hospital days. The average length of stay ranged from a low of 10.3 days for American Indians to a high of 12.2 for Asian persons. Patients whose primary diagnosis was diabetes had more inpatient days (40.0 days), and were hospitalized more often (3.5 discharges), than any other diagnosis group. Patients with interstitial nephritis and glomerulonephritis had the shortest average length of stay (10.7 and 10.8 days, respectively) compared to 11.0 days or more for the other diagnosis categories.

Functioning graft patients, as shown in Table 46, had the lowest use of inpatient services with 0.7 discharges (less than 1 per person per year), 6.0 total inpatient days, and an average length of stay of 8.7. Days of hospitalization increased with age, from 3.7 for those patients under 15 years of age to 9.2 for those 65 to 74 years of age. This trend was due predominantly to longer average lengths of stay which ranged from 5.5 days for those under 15 years of age to 10.8 for those 65 to 74 years of age. Males and females showed only minor differences in the various categories of utilization. American Indians and black persons were hospitalized for more total days (7.9 and 7.7 days, respectively) than were Asian persons (3.4 days) or white persons (5.7 days). Those patients whose primary diagnosis was diabetes experienced twice as many days per patient for the year (11.5 days) as other diagnostic groups which ranged from 4.0 days for those with obstructive nephropathy to 6.0 days for those whose renal failure was attributed to hypertension.

Inpatient utilization for graft failure patients is shown in Table 47. Patients experiencing a graft failure had the highest number of hospitalizations (3.1 discharges per person) of any treatment group. Persons in the 65-74 years of age category had the most discharges (3.6) in this treatment category. Utilization increased with age from 21.9 days for those 15 to 24 years of age to 38.9 days for those 65 to 74 years of age. Females experienced about 3 more total days of hospitalization per person for the year than did males (31.5 and 28.4, respectively) due mostly to longer lengths of stay. White persons and black persons were hospitalized about the same number of times for the year (3.3 and 3.1, respectively) and were also hospitalized for about the same number of days (30.2 and 29.8 inpatient days, respectively). Patients with diabetes as their primary diagnosis had 4.4 hospitalizations per year which averaged 11.5 days each. Consequently, this group also experienced the most total hospital days per person for the year (50.3) than the other diagnostic groups which ranged from 24.5 days for those with glomerulonephritis to 37.9 for those whose renal failure was attributed to interstitial nephropathy.

Table 42
Medicare end stage renal disease program inpatient hospital utilization,
by patient treatment group: 1985-90

	1985	1986	1987	1988	1989	1990	Average annual percent change
Total							
Number of patients	125,378	136,957	148,771	164,880	179,734	196,200	9.4
Discharges in thousands	183.5	199.8	212.8	234.5	257.6	283.3	9.1
Days in thousands	1,697.9	1,851.3	1,995.2	2,270.2	2,620.7	2,879.4	11.1
Average length of stay	9.3	9.3	9.4	9.7	10.2	10.2	1.9
Dialysis							
Number of patients	101,951	109,060	116,858	129,722	141,852	154,653	8.7
Discharges in thousands	151.2	162.3	172.4	192.9	214.3	236.6	9.4
Days in thousands	1,371.9	1,470.4	1,594.2	1,861.1	2,196.5	2,427.6	12.1
Average length of stay	9.1	9.1	9.2	9.6	10.3	10.3	2.5
Transplant							
Number of patients	7,026	8,274	8,235	8,102	8,104	8,885	4.8
Discharges in thousands	17.2	19.5	19.3	18.7	18.7	20.7	3.8
Days in thousands	197.3	227.5	222.7	212.4	208.4	223.9	2.6
Average length of stay	11.5	11.7	11.5	11.3	11.2	10.8	-1.2
Functioning Graft							
Number of patients	5,298	18,408	22,181	25,425	27,912	30,774	15.0
Discharges in thousands	12.0	14.4	16.6	17.9	19.1	20.8	11.7
Days in thousands	100.0	120.7	138.6	152.4	164.0	179.3	12.4
Average length of stay	8.3	8.4	8.3	8.5	8.6	8.6	0.7
Graft Failure							
Number of patients	1,103	1,215	1,497	1,631	1,866	1,888	11.3
Discharges in thousands	3.1	3.6	4.5	4.9	5.6	5.2	10.8
Days in thousands	28.6	32.7	39.6	44.3	51.8	48.7	11.2
Average length of stay	9.2	9.1	8.8	9.0	9.3	9.4	0.4

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Program Management and Medical Information System, and the Medicare Automated Data Retrieval System, April 1992 update, 1985-90.

Table 43
Medicare end stage renal disease program inpatient hospital utilization,
by patient treatment group, excluding Medicare secondary payer patients: 1985-90

	1985	1986	1987	1988	1989	1990	Average annual percent change
Total							
Number of patients	90,975	99,769	108,474	119,885	132,001	144,597	9.7
Discharges per patient	1.6	1.6	1.5	1.5	1.5	1.5	-0.2
Days per patient	14.8	14.8	14.7	15.2	16.1	16.1	1.8
Average length of stay	9.4	9.4	9.6	10.0	10.5	10.4	2.0
Dialysis							
Number of patients	72,946	78,228	83,751	91,904	100,926	110,195	8.6
Discharges per patient	1.6	1.7	1.6	1.7	1.7	1.7	0.8
Days per patient	15.3	15.5	15.7	16.7	18.0	18.1	3.3
Average length of stay	9.3	9.3	9.5	10.1	10.6	10.6	2.5
Transplant							
Number of patients	3,288	3,876	3,729	3,787	3,792	4,379	5.9
Discharges per patient	2.8	2.8	2.8	2.7	2.7	2.7	-0.5
Days per patient	33.3	33.6	33.0	32.4	31.2	30.5	-1.8
Average length of stay	11.9	12.2	11.9	11.9	11.5	11.1	-1.3
Functioning Graft							
Number of patients	13,788	16,627	19,721	22,843	25,657	28,404	15.6
Discharges per patient	0.8	0.8	0.7	0.7	0.7	0.7	-3.3
Days per patient	6.5	6.5	6.1	5.8	5.8	5.7	-2.6
Average length of stay	8.4	8.5	8.4	8.6	8.6	8.7	0.7
Graft Failure							
Number of patients	953	1,038	1,273	1,351	1,626	1,619	11.2
Discharges per patient	2.9	3.0	3.1	3.1	3.0	2.8	-0.2
Days per patient	26.4	28.1	27.2	28.2	27.9	26.8	0.3
Average length of stay	9.2	9.3	8.8	9.1	9.2	9.4	0.5

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Program Management and Medical Information System, and the Medicare Automated Data Retrieval System, April 1992 update, 1985-90.

Table 44

Medicare end stage renal disease program inpatient utilization for dialysis patients, by age, sex, race, and primary diagnosis, excluding Medicare secondary payer patients: 1990

Age, sex, race, and primary diagnosis	Number of patients	Number of days	Discharges per patient	Days per patient	Average length of stay	Annualized discharge per patient	Annualized days per patient
Total	110,195	293	1.7	18.1	10.6	2.1	22.6
Age							
Under 15 years	288	345	1.9	16.8	8.6	2.1	17.8
15-24 years	1,653	354	1.7	12.2	7.1	1.8	12.6
25-34 years	5,844	344	1.7	13.8	8.1	1.8	14.6
35-44 years	9,892	339	1.6	14.2	8.9	1.7	15.4
45-54 years	12,434	331	1.6	14.7	9.2	1.8	16.3
55-64 years	19,379	313	1.7	16.8	10.0	2.0	19.7
65-74 years	37,920	272	1.7	19.4	11.1	2.3	26.2
75 years or over	22,785	253	1.8	22.0	12.2	2.6	31.8
Sex							
Male	55,565	291	1.6	16.5	10.2	2.0	20.8
Female	54,630	295	1.8	19.7	10.9	2.2	24.4
Race							
Asian	1,857	293	1.1	11.6	10.5	1.4	14.6
Black	36,464	310	1.7	17.4	10.2	2.0	20.5
White	68,901	283	1.7	18.7	10.8	2.2	24.2
American Indian	1,152	297	2.0	18.9	9.4	2.5	23.3
Other/unknown	1,821	317	1.5	13.9	9.6	1.7	16.0
Primary diagnosis							
Diabetes	27,350	273	2.1	23.7	11.6	2.7	31.8
Glomerulonephritis	16,149	313	1.5	14.6	9.6	1.8	17.1
Hypertension	32,473	281	1.7	17.8	10.5	2.2	23.1
Polycystic kidney disease	4,300	323	1.4	12.4	8.8	1.6	14.0
Interstitial nephritis	4,165	307	1.7	17.1	9.9	2.1	20.4
Obstructive nephropathy	3,107	298	1.5	16.0	10.4	1.9	19.6
Other	5,306	292	1.7	17.6	10.2	2.2	22.1
Unknown	8,074	303	1.6	16.9	10.6	1.9	20.4
Not reported	9,271	329	1.4	13.7	9.8	1.6	15.3

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Program Management and Medical Information System, and the Medicare Automated Data Retrieval System, April 1992 update, 1990.

Table 45

Medicare end stage renal disease program inpatient utilization for transplant patients, by age, sex, race, and primary diagnosis, excluding Medicare secondary payer patients: 1990

Age, sex, race and primary diagnosis	Number of patients	Number of days	Discharges per patient	Days per patient	Average length of stay	Annualized discharge per patient	Annualized days per patient
Total	4,379	352	2.7	30.5	11.1	2.9	31.7
Age							
Under 15 years	108	358	3.7	43.3	11.7	3.8	44.3
15-24 years	355	356	2.8	28.1	9.9	2.9	28.9
25-34 years	921	356	2.8	30.5	10.9	2.9	31.4
35-44 years	1,151	353	2.7	30.1	11.1	2.8	31.2
45-54 years	960	354	2.7	30.9	11.4	2.8	31.9
55-64 years	646	348	2.6	30.1	11.6	2.7	31.7
65-74 years	228	330	2.7	29.3	10.8	3.0	32.5
75 years or over	10	—	—	—	—	—	—
Sex							
Male	2,560	352	2.7	30.2	11.2	2.8	31.4
Female	1,819	353	2.8	30.9	11.0	2.9	32.1
Race							
Asian	114	352	2.1	25.3	12.2	2.2	26.4
Black	1,174	357	2.8	31.6	11.2	2.9	32.4
White	3,007	350	2.7	30.2	11.0	2.9	31.6
American Indian	51	357	3.4	34.8	10.3	3.5	35.7
Other/unknown	33	357	2.5	27.8	10.9	2.6	28.5
Primary diagnosis							
Diabetes	717	350	3.3	38.2	11.5	3.5	40.0
Glomerulonephritis	1,240	355	2.6	28.4	10.8	2.7	29.3
Hypertension	728	353	2.5	28.5	11.3	2.6	29.5
Polycystic kidney disease	319	355	2.6	28.3	11.1	2.6	29.2
Interstitial nephritis	177	352	2.5	26.9	10.7	2.6	27.9
Obstructive nephropathy	99	361	2.6	31.4	12.0	2.6	31.8
Other	361	355	2.8	30.3	10.6	2.9	31.2
Unknown	351	351	2.7	29.5	10.9	2.8	30.8
Not reported	387	339	2.6	30.9	11.7	2.8	33.4

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Program Management and Medical Information System, and the Medicare Automated Data Retrieval System, April 1992 update, 1990.

Table 46

Medicare end stage renal disease program inpatient utilization for functioning graft patients, by age, sex, race, and primary diagnosis, excluding Medicare secondary payer patients: 1990

Age, sex, race, and primary diagnosis	Number of patients	Number of days	Discharges per patient	Days per patient	Average length of stay	Annualized discharge per patient	Annualized days per patient
Total	28,404	348	0.7	5.7	8.7	0.7	6.0
Age							
Under 15 years	703	341	0.6	3.5	5.5	0.7	3.7
15-24 years	1,829	347	0.5	3.6	6.6	0.6	3.8
25-34 years	5,810	351	0.6	4.6	7.5	0.6	4.8
35-44 years	8,058	351	0.7	5.7	8.8	0.7	6.0
45-54 years	6,321	346	0.7	6.0	9.2	0.7	6.3
55-64 years	4,281	346	0.7	7.1	9.6	0.8	7.6
65-74 years	1,329	346	0.8	8.7	10.8	0.9	9.2
75 years or over	73	343	0.7	5.4	7.5	0.8	5.7
Sex							
Male	17,450	348	0.6	5.7	9.0	0.7	6.0
Female	10,954	349	0.7	5.8	8.2	0.7	6.1
Race							
Asian	589	352	0.5	3.3	7.0	0.5	3.4
Black	4,908	351	0.8	7.3	9.2	0.8	7.7
White	22,341	348	0.6	5.4	8.6	0.7	5.7
American Indian	273	347	0.9	7.4	8.2	1.0	7.9
Other/unknown	293	357	0.5	3.6	7.1	0.5	3.7
Primary diagnosis							
Diabetes	5,193	347	1.1	10.9	9.8	1.2	11.5
Glomerulonephritis	7,640	349	0.5	3.9	7.8	0.5	4.1
Hypertension	3,348	350	0.7	5.7	8.6	0.7	6.0
Polycystic kidney disease	2,071	347	0.5	4.6	8.5	0.6	4.8
Interstitial nephritis	1,222	347	0.5	3.8	7.7	0.5	4.1
Obstructive nephropathy	775	349	0.5	3.8	8.1	0.5	4.0
Other	1,943	347	0.6	3.7	6.4	0.6	3.9
Unknown	2,186	348	0.6	5.8	10.0	0.6	6.1
Not reported	4,026	349	0.6	5.0	8.3	0.6	5.2

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Program Management and Medical Information System, and the Medicare Automated Data Retrieval System, April 1992 update, 1990.

Table 47

Medicare end stage renal disease program Inpatient utilization for graft failure patients, by age, sex, race, and primary diagnosis, excluding Medicare secondary payer patients: 1990

Age, sex, race, and primary diagnosis	Number of patients	Number of days	Discharges per patient	Days per patient	Average length of stay	Annualized discharge per patient	Annualized days per patient
Total	1,619	331	2.8	26.8	9.4	3.1	29.7
Age							
Under 15 years	35	335	3.1	22.9	7.3	3.4	25.0
15-24 years	175	341	2.9	20.4	7.1	3.1	21.9
25-34 years	375	339	3.0	25.2	8.4	3.2	27.2
35-44 years	477	331	2.9	27.9	9.7	3.2	30.8
45-54 years	331	332	2.7	28.4	10.7	2.9	31.3
55-64 years	181	308	2.8	30.3	11.0	3.3	36.0
65-74 years	44	296	2.9	31.5	10.8	3.6	38.9
75 years or over	1	—	—	—	—	—	—
Sex							
Male	955	329	2.8	25.6	9.1	3.1	28.4
Female	664	333	2.9	28.6	9.8	3.2	31.5
Race							
Asian	24	—	—	—	—	—	—
Black	556	341	2.8	27.8	9.8	3.1	29.8
White	1,017	324	2.9	26.8	9.3	3.3	30.2
American Indian	16	—	—	—	—	—	—
Other/unknown	6	—	—	—	—	—	—
Primary diagnosis							
Diabetes	223	315	3.8	43.3	11.5	4.4	50.3
Glomerulonephritis	468	333	2.7	22.3	8.1	3.0	24.5
Hypertension	300	341	2.6	24.3	9.3	2.8	26.1
Polycystic kidney disease	71	319	2.3	30.8	13.2	2.7	35.4
Interstitial nephritis	52	334	3.0	34.6	11.4	3.3	37.9
Obstructive nephropathy	25	—	—	—	—	—	—
Other	139	332	3.1	27.2	8.7	3.5	30.0
Unknown	253	330	2.7	24.6	9.1	3.0	27.3
Not reported	88	329	2.2	18.3	8.2	2.5	20.3

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Program Management and Medical Information System, and the Medicare Automated Data Retrieval System, April 1992 update, 1990.

Program expenditures

Data

Expenditures for this section were obtained from the Medicare Automated Data Retrieval System (MADRS) at HCFA. MADRS is a system for linking Part A and Part B expenditure records by beneficiary for each calendar year. Records for ESRD beneficiaries in the ESRD Program Management and Medical Information System (PMMIS) were linked with MADRS for this analysis. At the time of this data report, complete data were available for the years 1985 through 1990.

Program expenditures include Medicare payments for all medical services for which Medicare beneficiaries are eligible. These services include inpatient hospital care, outpatient services (mostly dialysis), physician services, skilled nursing care, and home health care. Dialysis services, for the most part, are paid for under the composite rate methodology, which was approximately \$127 per dialysis session for 1984 to 1987 and \$125 for 1988 through 1990. Because outpatient dialysis is a Part B service, Medicare pays 80 percent of the composite rate with the beneficiary or other third party payer responsible for the remaining 20 percent. Patients who dialyze at home may select one of two methods for reimbursement of the cost of dialysis services. Under the Method I option, home dialysis supplies are obtained through the patient's dialysis facility which, in turn, bills the Medicare intermediary at the same composite rate as they bill for in-center dialysis. Dialysis expenditures for these patients appear in the outpatient category. Under Method II, the beneficiary obtains dialysis supplies directly from the supplier and then bills the Medicare carrier directly for those dialysis supplies. Dialysis expenditures for these persons appear in the physician/supplier category. In 1990, there were about 20,000 patients who dialyzed at home. Approximately 12,000 of these beneficiaries selected Method I for reimbursement and approximately 8,000 selected Method II. Payments for physician care, which is deemed to be part of the routine care of dialysis patients, is based on a capitation rate methodology system. From 1984 to 1986, the average amount for this physician care was \$188 per month; since 1986, the average rate has been \$173 per month. In addition, this section includes Medicare covered physician expenditures for all nondialysis related care. Payment for hospital care is based on the prospective payment system, under which Medicare pays a predetermined amount per hospital stay, depending on the diagnosis and/or procedure associated with the stay. For each hospital episode, lasting until there is a 90-day break between stays, the patient is responsible for a deductible. This deductible is roughly equivalent to 1 day of a hospital stay. This amount was \$400 in 1984; by 1990 it had risen to \$592.

Much of the Part B data in MADRS is aggregated to the calendar year level. Therefore, it is not possible to link expenditures with time intervals shorter than a calendar year. This presents a particular analysis problem for the ESRD population because of the high turnover rate among

patients. Each year a large percentage of patients have only a partial year of Medicare coverage due to the high rate of new patients entering the program and the high mortality rate. The descriptive tables shown in this section are based on all ESRD patients ever enrolled during each of the years 1985 through 1990. In order to reduce biases due to differential mortality rates, the reimbursement data in Tables 50 through 53 display reimbursement rates both in unadjusted form and annualized for the average number of days during the year that people in each group were ESRD and Medicare entitled. The annualized values are estimated by a linear extrapolation of the basic per capita figures to a full year (365 days) of coverage. Annualization is most important for the age groups and primary diagnosis classification since, in general, older people and diabetics have the fewest numbers of days at risk. Unless otherwise stated, all results in Tables 50 through 53 are based on annualized values.

Another qualification on these expenditure data concerns the provisions of Medicare as a secondary payer, as described on page 47, under Hospital Inpatient Utilization. Because of this problem, Tables 49 through 53 are based only on patients who have had Medicare coverage for at least 1 year prior to January 1, 1990. An additional criteria was added for dialysis, transplant and graft failure patients. In order to be included in these tables, these patients had to have had some Medicare reimbursements in the observation year. This criteria was not applied to functioning graft patients.

Patients have been grouped in these tables according to four basic treatment categories, as in the chapter on hospitalization. These mutually exclusive and exhaustive groups are: (1) patients on dialysis during their entire coverage period within the observation year; (2) patients receiving a transplant during their coverage period during the observation year; (3) patients receiving a transplant prior to the observation year and maintaining a functioning graft throughout the observation year; and (4) patients receiving a transplant prior to the observation year but whose graft failed during the observation year.

Results

Medicare program expenditures for the years 1985 through 1990 by patient treatment group and by type of service are shown in Table 48. Total expenditures increased from \$2,680.1 million in 1985 to \$5,227.6 million in 1990, an average annual increase of 14.3 percent. The number of persons ever enrolled during each year increased from 125,378 in 1985 to 196,200 in 1990, an average annual increase of 9.4 percent. Dialysis accounted for both the majority of patients and the bulk of program expenditures. In 1985, dialysis patients accounted for 81.3 percent of all patients and 82.2 percent of all program expenditures. By 1990, dialysis patients accounted for 78.8 percent of all patients and 84.1 percent of all program expenditures. The next largest group, in terms of program expenditures, was persons receiving

kidney transplants. In 1990, they accounted for 4.5 percent of all patients and 10.4 percent of all program expenditures. Persons with a functioning graft were the fastest growing group of patients during this time period (see Incidence and Enrollment chapter, Table 8). This group increased at an average annual rate of 15.0 percent (15,298 in 1985 and 30,774 in 1990). As a result, they increased as a percent of the total Medicare enrollment from 12.2 percent in 1985 to 15.7 percent in 1990. However, due to the fact that they were not on maintenance dialysis and that they were beyond the transplant year costs, they accounted for only 3.3 percent of program expenditures in 1985, increasing to 4.1 percent in 1990. Finally, previously transplanted patients experiencing a graft failure accounted for only 1.0 percent of patients and about 1.3 percent of program expenditures. In 1990, 45.1 percent of program expenditures (\$2,357.3 million) were accounted for by inpatient hospital stays. Outpatient billings (most of which were for maintenance dialysis) accounted for 32.8 percent of program expenditures (\$1,713.2 million). Physician/supplier billings (which included some home dialysis expenditures) accounted for 21.3 percent of expenditures (\$1,111.1 million) and the remaining 0.9 percent was due to skilled nursing facility and home health care use (\$45.9 million). For 1990, the distribution of expenditures by type of service varied greatly by treatment category. Inpatient expenditures for dialysis patients exceeded dialysis outpatient expenditures (\$1,776.2 million and \$1,608.2 million respectively), with an additional 22.1 percent due to physician/supplier billings. The other treatment categories were even more heavily weighted toward inpatient stays. Inpatient stays accounted for 75.4 percent of the costs of transplant patients (\$411.4 million), 61.1 percent of the costs of functioning graft patients (\$130.5 million), and 56.6 percent of the costs of patients experiencing a graft failure (\$39.3 million).

The annual expenditure data expressed in terms of expenditures per enrolled person is shown in Table 49. Overall, Medicare expenditures per enrolled ESRD beneficiary increased from \$23,479 in 1985 to \$29,497 in 1990, an average annual increase of 4.7 percent. For dialysis patients, expenditures in 1985 and 1990 were \$25,007 and \$33,165 respectively. The increase in expenditures for dialysis patients was due mostly to increases in inpatient expenditures (6.7 percent average annual increase) and physician/supplier expenditures (8.6 average percent annual increase). Per capita expenditures for dialysis, represented by outpatient billings, remained essentially unchanged during the 5-year period, 1985 through 1989, with a 10.8 percent increase from 1989 to 1990. The increase in 1990 was due largely to the widespread use of erythropoietin for the treatment of anemia in dialysis patients. Per capita expenditures for transplant recipients increased from \$61,669 in 1985 to \$79,955 in 1990, a 5.3 percent annual rate of increase. Most of the increase in the costs of transplant patients was due to inpatient expenditures which increased at an annual rate of 5.4 percent, from \$46,130 in 1985 to \$59,878 in 1990. Outpatient expenditures, mainly representing dialysis costs prior to

the transplant and dialysis costs for failed grafts, remained relatively constant during this 6-year period, except for an increase in 1990 due, as with dialysis patients, to erythropoietin costs. Per capita expenditures were lowest for patients with a functioning graft. In 1985, expenditures for this group were \$5,733, increasing to \$6,930 by 1990, an average annual increase of 3.9 percent. Inpatient expenditures increased slightly for this group during this period. Physician/supplier costs increased at an annual rate of 8.4 percent, from \$1,157 in 1985 to \$1,734 in 1990. Patients experiencing a graft failure had expenditures of \$31,436 in 1985 and \$39,333 in 1990, an average annual increase of 4.6 percent. The average annual percent increases from 1985 through 1990 for inpatient services was 4.8 percent (\$17,666 and \$22,316, respectively) and for physician/supplier services 6.4 percent (\$5,507 and \$7,525, respectively).

Tables 50, 51, 52, and 53 show per capita expenditures by age, sex, race, and primary cause of renal failure for the four treatment groups: dialysis, transplant, functioning graft, and graft failure, respectively. The average number of days of Medicare coverage by category in each subgroup (age, sex, race, and diagnosis) is shown in the parentheses. The four tables show that the average days of coverage was 38 days less per year for dialysis patients than for the next lowest group, which was the graft failure patients (293 and 331, respectively). The days of coverage are used to annualized expenditure amounts, shown in the last column of each table. Unless otherwise noted, the following discussion will be based on the annualized expenditure figures.

Expenditures for dialysis patients (Table 50) increased moderately with age, from a low of \$32,219 for persons 15 to 24 years of age to \$33,836 for persons 65 to 74 years of age. However, this understates the relative costs because the average number of days of coverage decreased with age. For example, persons in the youngest age group averaged 345 days of coverage in 1990 while persons 75 years of age and older averaged 253 days of coverage. When the expenditures are annualized, age effects become more evident. Estimated annual per capita expenditures ranged from a low of \$33,220 among persons 15-24 years of age to a high of \$47,926 among persons 75 years of age and older—representing a 44.3 percent difference. Female beneficiaries had higher annual per capita expenditures than did male beneficiaries (\$42,565 and \$40,072 respectively). Among racial groups, annual expenditures per person ranged from a low of \$36,377 for Asian persons to a high of \$42,183 for white persons. Annualized per capita expenditures for black persons and American Indians were \$40,402 and \$41,819 respectively. Dialysis patients whose renal failure was attributed to diabetes had the highest expenditure level (\$49,040), followed by persons whose renal failure was attributed to hypertension (\$43,213). Persons with interstitial nephritis and obstructive nephropathy had annualized expenditure amounts of \$39,037 and \$38,025, respectively, while persons with glomerulonephritis and polycystic kidney disease had annualized expenditure amounts of \$36,556 and \$34,556, respectively.

Annualized expenditures for transplant recipients (Table 51) ranged from a low of \$77,551 for persons 15 to

24 years of age to a high of \$89,600 for persons under 15 years of age. Male and female beneficiaries had comparable annualized expenditure levels (\$82,363 and \$83,436, respectively). Asian transplant recipients had the lowest (\$77,734) and American Indian transplant recipients had the highest (\$87,755) annualized per capita expenditures. Among diagnostic categories, transplant recipients whose renal failure was attributed to diabetes had the highest average expenditures (\$86,741). The lowest average annualized expenditures were among persons whose renal failure was attributed to obstructive nephropathy (\$79,558), glomerulonephritis (\$79,881), and interstitial nephritis (\$80,627).

Average annualized expenditures for functioning graft patients (Table 52) ranged, by age, from a low of \$5,225 for persons 15 to 24 years of age to a high of \$10,312 for persons 65 to 74 years of age. There was little difference in annualized expenditures between male and female beneficiaries (\$7,199 and \$7,355, respectively). Black beneficiaries had the highest average annualized expenditures (\$8,748), followed by American Indians (\$7,764), white (\$6,996), and Asian (\$5,478) beneficiaries. Table 52 also shows that the average annualized

expenditures per person for functioning graft patients whose renal failure was attributed to diabetic nephropathy (\$12,052), was over twice as great as that for patients in all other diagnostic categories, except for hypertension (\$7,607) and polycystic kidney disease (\$6,601). Per capita annualized expenditures were the lowest for those whose renal failure was attributed to obstructive nephropathy (\$4,861).

Among graft failure patients (Table 53), per capita annualized expenditures generally increased with age, from \$38,395 for persons ages 15 to 24 to \$50,054 for persons ages 65 to 74. Female beneficiaries had average annualized expenditures which were \$2,872 greater than male beneficiaries (\$45,105 and \$42,233 respectively). There was little difference between black and white beneficiaries in annualized expenditures. Among diagnostic groups, the highest average per person annualized expenditures were those whose renal failure was attributed to diabetic nephropathy (\$56,016). Annualized expenditures for the other groups ranged from a low of \$39,862 for hypertension to a high of \$49,571 for interstitial nephritis.

Table 48
Medicare end stage renal disease program expenditures,
by patient treatment group: 1985-90

Treatment group	1985	1986	1987	1988	1989	1990	Percent distribution 1990	Average annual percent change 1985-90
Expenditures in millions								
Total								
Number of patients	125,378	136,957	148,771	164,880	179,734	196,200	100.0	9.4
Expenditures								
Total	\$2,680.1	\$3,108.6	\$3,441.7	\$3,842.0	\$4,525.9	\$5,227.6	100.0	14.3
Inpatient	1,215.7	1,434.9	1,565.4	1,741.5	2,085.5	2,357.3	45.1	14.2
Outpatient	957.3	1,076.6	1,177.4	1,287.1	1,418.1	1,713.2	32.8	12.3
Physician/supplier	492.5	581.1	682.0	793.7	995.9	1,111.1	21.3	17.7
Other ¹	14.7	16.0	17.0	20.0	26.4	45.9	0.9	25.6
Dialysis								
Number of patients	101,951	109,060	116,858	129,722	141,852	154,653	78.8	8.7
Expenditures								
Total	\$2,204.8	\$2,513.9	\$2,796.6	\$3,184.4	\$3,791.6	\$4,398.7	100.0	14.8
Inpatient	866.4	996.0	1,098.8	1,277.5	1,569.0	1,776.2	40.4	15.4
Outpatient	898.5	1,004.9	1,097.8	1,202.5	1,328.6	1,608.5	36.6	12.4
Physician/supplier	426.6	498.8	585.2	687.0	870.8	973.2	22.1	17.9
Other ¹	13.5	14.1	14.8	17.4	23.3	40.7	0.9	24.7
Transplant								
Number of patients	7,026	8,274	8,235	8,102	8,104	8,885	4.5	4.8
Expenditures								
Total	\$353.9	\$441.9	\$457.0	\$442.5	\$474.1	\$545.8	100.0	9.1
Inpatient	270.8	340.6	350.7	332.8	357.9	411.4	75.4	8.7
Outpatient	40.4	48.9	50.2	51.1	51.0	62.2	11.4	9.0
Physician/supplier	42.4	51.7	55.6	57.9	64.5	70.9	13.0	10.8
Other ¹	0.4	0.6	0.6	0.7	0.7	1.2	0.2	25.5
Functioning graft								
Number of patients	15,298	18,408	22,181	25,425	27,912	30,774	15.7	15.0
Expenditures								
Total	\$87.5	\$113.3	\$137.1	\$157.5	\$188.0	\$213.5	100.0	19.5
Inpatient	59.5	75.7	86.7	97.5	116.0	130.5	61.1	17.0
Outpatient	9.6	12.9	17.0	20.3	23.4	25.9	12.1	21.9
Physician/supplier	17.7	23.6	32.0	38.0	46.5	53.5	25.1	24.8
Other ¹	0.8	1.1	1.4	1.7	2.1	3.7	1.7	35.6
Graft failure								
Number of patients	1,103	1,215	1,497	1,631	1,866	1,888	1.0	11.3
Expenditures								
Total	\$33.8	\$39.4	\$51.0	\$57.7	\$72.1	\$69.5	100.0	15.5
Inpatient	19.1	22.5	29.2	33.5	42.6	39.3	56.6	15.5
Outpatient	8.8	9.8	12.4	13.2	15.1	16.5	23.7	13.4
Physician/supplier	5.9	6.9	9.2	10.8	14.2	13.4	19.3	17.9
Other ¹	0.1	0.2	0.1	0.2	0.2	0.3	0.4	23.0

¹Other includes skilled nursing facility and home health services.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Program Management and Medical Information System, and the Medicare Automated Data Retrieval System, April 1992 update, 1985-90.

Table 49
Medicare end stage renal disease program expenditures per patient,
by patient treatment group, excluding Medicare secondary payer patients¹: 1985-90

Treatment groups	1985	1986	1987	1988	1989	1990	Average annual percent change 1985-90
Expenditures per person							
Total							
Number of patients	90,975	99,769	108,474	119,885	132,001	144,597	9.7
Expenditures (per patient)							
Total	\$23,479	\$24,957	\$25,501	\$25,879	\$27,823	\$29,497	4.7
Inpatient	10,177	11,087	11,190	11,429	12,555	13,065	5.1
Outpatient	8,774	8,999	9,057	8,929	8,917	9,831	2.3
Physician/supplier	4,392	4,737	5,122	5,383	6,182	6,331	7.6
Other ²	136	134	132	139	170	271	14.8
Dialysis							
Number of patients	72,946	78,228	83,751	91,904	100,926	110,195	8.6
Expenditures (per patient)							
Total	\$25,007	\$26,700	\$27,891	\$28,716	\$31,159	\$33,165	5.8
Inpatient	9,644	10,443	10,890	11,429	12,831	13,341	6.7
Outpatient	10,355	10,810	11,040	10,963	10,984	12,167	3.3
Physician/supplier	4,852	5,296	5,812	6,165	7,149	7,344	8.6
Other ²	155	152	149	158	196	313	15.1
Transplant							
Number of patients	3,288	3,876	3,729	3,787	3,792	4,379	5.9
Expenditures (per patient)							
Total	\$61,669	\$68,036	\$70,559	\$72,051	\$76,435	\$79,955	5.3
Inpatient	46,130	51,731	53,128	53,622	57,135	59,878	5.4
Outpatient	8,039	8,270	8,597	8,895	8,886	9,664	3.8
Physician/supplier	7,426	7,936	8,731	9,417	10,290	10,221	6.6
Other ²	73	99	104	117	124	191	21.2
Functioning graft							
Number of patients	13,788	16,627	19,721	22,843	25,657	28,404	15.6
Expenditures (per patient)							
Total	\$5,733	\$6,160	\$6,184	\$6,138	\$6,756	\$6,930	3.9
Inpatient	3,901	4,120	3,935	3,817	4,184	4,250	1.7
Outpatient	621	694	754	780	826	823	5.8
Physician/supplier	1,157	1,287	1,431	1,476	1,668	1,734	8.4
Other ²	54	59	65	65	78	123	17.9
Graft failure							
Number of patients	953	1,038	1,273	1,351	1,626	1,619	11.2
Expenditures (per patient)							
Total	\$31,436	\$33,802	\$35,541	\$37,304	\$39,837	\$39,333	4.6
Inpatient	17,666	19,416	20,534	21,812	23,502	22,316	4.8
Outpatient	8,190	8,293	8,572	8,486	8,425	9,333	2.6
Physician/supplier	5,507	5,932	6,333	6,897	7,782	7,525	6.4
Other ²	74	161	103	109	128	159	16.5

¹Expenditures were calculated only for persons who had at least one full year of Medicare entitlement prior to the observation year. Thus, any patients for whom Medicare was a secondary payer were not included.

²Other includes skilled nursing facility and home health services.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Program Management and Medical Information System, and the Medicare Automated Data Retrieval System, April 1992 update, 1985-90.

Table 50

Medicare end stage renal disease program expenditures for dialysis patients, by age, sex, race, and primary diagnosis, excluding Medicare secondary payer patients¹: 1990

Age, sex, race, and primary diagnosis	Number of persons ²	Expenditures per person					
		Inpatient	Outpatient	Physician/supplier	Other	Total	Annualized
Total	110,195 (293)	\$13,341	\$12,167	\$7,344	\$313	\$33,165	\$41,315
Age							
Under 15 years	288 (345)	15,565	12,819	7,977	31	36,392	38,502
15 - 24 years	1,653 (354)	11,626	14,240	6,322	30	32,219	33,220
25 - 34 years	5,844 (344)	11,668	14,087	6,614	140	32,510	34,495
35 - 44 years	9,892 (339)	11,416	13,995	6,761	144	32,316	34,795
45 - 54 years	12,434 (331)	11,638	13,847	6,927	197	32,610	35,960
55 - 64 years	19,379 (313)	12,139	13,268	7,118	281	32,806	38,256
65 - 74 years	37,920 (272)	14,482	11,332	7,646	377	33,836	45,405
75 years or over	22,785 (253)	14,754	10,258	7,767	442	33,220	47,926
Sex							
Male	55,565 (291)	12,816	11,788	7,082	263	31,948	40,072
Female	54,630 (295)	13,875	12,552	7,610	365	34,402	42,565
Race							
Asian	1,857 (293)	9,665	13,442	5,967	126	29,201	36,377
Black	36,464 (310)	13,357	13,490	7,189	279	34,314	40,402
White	68,901 (283)	13,462	11,405	7,497	342	32,706	42,183
American Indian	1,152 (297)	14,239	13,161	6,400	227	34,028	41,819
Other/unknown	1,821 (317)	11,605	12,565	6,649	183	31,001	35,695
Primary diagnosis							
Diabetes	27,350 (273)	15,998	11,747	8,390	544	36,679	49,040
Glomerulonephritis	16,149 (313)	11,304	13,094	6,781	169	31,348	36,556
Hypertension	32,473 (281)	13,679	11,973	7,334	282	33,268	43,213
Polycystic kidney disease	4,300 (323)	10,074	13,672	6,700	133	30,580	34,556
Interstitial nephritis	4,165 (307)	12,437	12,856	7,277	264	32,834	39,037
Obstructive nephropathy	3,107 (298)	11,900	12,151	6,727	267	31,045	38,025
Other	5,306 (292)	13,934	11,593	7,173	224	32,923	41,154
Unknown	8,074 (303)	12,546	12,446	6,797	233	32,023	38,576
Not reported	9,271 (329)	10,624	11,553	6,378	236	28,792	31,942

¹Expenditures were calculated only for persons who had at least one full year of Medicare entitlement prior to the observation year. Thus, any patients for whom Medicare was a secondary payer were not included.

²Average number of days of Medicare coverage shown in parentheses.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Program Management and Medical Information System, and the Medicare Automated Data Retrieval System, April 1992 update.

Table 51

Medicare end stage renal disease program expenditures for transplant patients, by age, sex, race, and primary diagnosis, excluding Medicare secondary payer patients¹: 1990

Age, sex, race, and primary diagnosis	Number of persons ²	Expenditures per person				Total	Annualized
		Inpatient	Outpatient	Physician/supplier	Other		
Total	4,379 (352)	\$59,878	\$9,664	\$10,221	\$191	\$79,955	\$82,908
Age							
Under 15 years	108 (358)	65,171	9,477	13,176	58	87,882	89,600
15 - 24 years	355 (356)	56,509	9,860	9,242	28	75,639	77,551
25 - 34 years	921 (356)	60,233	9,959	10,010	142	80,345	82,376
35 - 44 years	1,151 (353)	59,687	9,420	10,160	189	79,456	82,157
45 - 54 years	960 (354)	60,246	9,556	10,191	251	80,244	82,737
55 - 64 years	646 (348)	60,404	9,722	10,412	256	80,794	84,741
65 - 74 years	228 (330)	59,178	9,930	11,146	262	80,515	89,054
75 years or over	10	—	—	—	—	—	—
Sex							
Male	2,560 (352)	59,603	9,617	10,033	177	79,430	82,363
Female	1,819 (353)	60,267	9,731	10,485	211	80,693	83,436
Race							
Asian	114 (352)	55,238	10,530	9,162	35	74,965	77,734
Black	1,174 (357)	62,953	9,949	9,754	226	82,882	84,739
White	3,007 (350)	58,705	9,547	10,444	185	78,880	82,261
American Indian	51 (357)	67,252	8,700	9,718	163	85,832	87,755
Other/unknown	33 (357)	62,065	8,787	10,918	120	81,890	83,725
Primary diagnosis							
Diabetes	717 (350)	61,689	9,382	11,627	478	83,176	86,741
Glomerulonephritis	1,240 (355)	57,819	9,943	9,822	107	77,692	79,881
Hypertension	728 (353)	62,006	9,771	9,779	219	81,776	84,556
Polycystic kidney disease	319 (355)	60,842	9,337	9,693	59	79,932	82,184
Interstitial nephritis	177 (352)	58,155	9,735	9,705	159	77,755	80,627
Obstructive nephropathy	99 (361)	58,401	10,127	10,020	138	78,686	79,558
Other	361 (355)	58,637	9,910	10,502	107	79,156	81,386
Unknown	351 (351)	59,580	9,631	10,236	119	79,567	82,741
Not reported	387 (339)	60,921	9,013	10,169	156	80,259	86,415

¹Expenditures were calculated only for persons who had at least one full year of Medicare entitlement prior to the observation year. Thus, any patients for whom Medicare was a secondary payer were not included.

²Average number of days of Medicare coverage shown in parentheses.

NOTE: Rates based on fewer than 30 observations are not displayed.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Program Management and Medical Information System, and the Medicare Automated Data Retrieval System; April 1992 update.

Table 52

Medicare end stage renal disease program expenditures for functioning graft patients, by age, sex, race, and primary diagnosis, excluding Medicare secondary payer patients¹: 1990

Age, sex, race, and primary diagnosis	Number of persons ²	Expenditures per person				Total	Annualized
		Inpatient	Outpatient	Physician/ supplier	Other		
Total	28,404 (348)	\$4,250	\$823	\$1,734	\$123	\$6,930	\$7,269
Age							
Under 15 years	703 (341)	3,386	948	1,158	33	5,527	5,916
15 - 24 years	1,829 (347)	2,897	859	1,189	21	4,967	5,225
25 - 34 years	5,810 (351)	3,425	767	1,381	71	5,644	5,869
35 - 44 years	8,058 (351)	4,115	791	1,669	125	6,700	6,967
45 - 54 years	6,321 (346)	4,471	827	1,805	149	7,253	7,651
55 - 64 years	4,281 (346)	5,464	904	2,301	167	8,837	9,322
65 - 74 years	1,329 (346)	6,099	879	2,549	248	9,775	10,312
75 years or over	73 (343)	2,975	606	1,744	245	5,570	5,927
Sex							
Male	17,450 (348)	4,258	794	1,698	115	6,864	7,199
Female	10,954 (349)	4,238	870	1,790	136	7,033	7,355
Race							
Asian	589 (352)	3,157	686	1,369	71	5,283	5,478
Black	4,908 (351)	5,382	949	1,928	152	8,412	8,748
White	22,341 (348)	4,040	801	1,710	119	6,670	6,996
American Indian	273 (347)	4,972	812	1,518	79	7,381	7,764
Other/unknown	93 (357)	2,855	670	1,195	86	4,806	4,914
Primary diagnosis							
Diabetes	5,193 (347)	7,336	1,046	2,706	370	11,458	12,052
Glomerulonephritis	7,640 (349)	3,086	716	1,350	34	5,185	5,423
Hypertension	3,348 (350)	4,509	864	1,806	115	7,294	7,607
Polycystic kidney disease	2,071 (347)	3,638	858	1,717	61	6,275	6,601
Interstitial nephritis	1,222 (347)	3,027	775	1,496	52	5,350	5,628
Obstructive nephropathy	775 (349)	2,572	752	1,270	54	4,648	4,861
Other	1,943 (347)	3,240	869	1,391	32	5,532	5,819
Unknown	2,186 (348)	4,134	784	1,487	93	6,499	6,816
Not reported	4,026 (349)	3,822	716	1,616	106	6,260	6,547

¹Expenditures were calculated only for persons who had at least one full year of Medicare entitlement prior to the observation year. Thus, any patients for whom Medicare was a secondary payer were not included.

²Average number of days of Medicare coverage shown in parentheses.

NOTE: Rates based on fewer than 30 observations are not displayed.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Program Management and Medical Information System, and the Medicare Automated Data Retrieval System, August 1991 update.

Table 53

Medicare end stage renal disease program expenditures for graft failure patients, by age, sex, race, and primary diagnosis, excluding Medicare secondary payer patients¹: 1990

Age, sex, race, and primary diagnosis	Number of persons ²	Expenditures per person					Annualized
		Inpatient	Outpatient	Physician/supplier	Other	Total	
Total	1,619 (331)	\$22,316	\$9,333	\$7,525	\$159	\$39,333	\$43,373
Age							
Under 15 years	35 (335)	22,123	9,640	5,696	14	37,473	40,829
15 - 24 years	175 (341)	19,989	9,574	6,262	45	35,870	38,395
25 - 34 years	375 (339)	22,615	10,224	7,841	68	40,748	43,873
35 - 44 years	477 (331)	22,254	8,983	7,577	186	39,001	43,007
45 - 54 years	331 (332)	22,732	9,090	7,702	266	39,790	43,745
55 - 64 years	181 (308)	22,836	8,897	7,828	233	39,794	47,158
65 - 74 years	44 (296)	24,644	7,893	7,943	111	40,592	50,054
75 years or over	1	—	—	—	—	—	—
Sex							
Male	955 (329)	21,658	9,226	7,077	107	38,068	42,233
Female	664 (333)	23,262	9,487	8,168	234	41,151	45,105
Race							
Asian	24	—	—	—	—	—	—
Black	556 (341)	22,758	10,227	7,242	174	40,401	43,244
White	1,017 (324)	22,368	8,833	7,722	157	39,081	44,026
American Indian	16	—	—	—	—	—	—
Other/unknown	6	—	—	—	—	—	—
Primary diagnosis							
Diabetes	223 (315)	29,226	8,089	10,510	518	48,343	56,016
Glomerulonephritis	468 (333)	21,164	9,377	6,620	64	37,225	40,802
Hypertension	300 (341)	20,447	9,787	6,888	119	37,241	39,862
Polycystic kidney disease	71 (319)	21,916	8,214	8,565	80	38,775	44,366
Interstitial nephritis	52 (334)	24,802	12,211	8,126	221	45,361	49,571
Obstructive nephropathy	25	—	—	—	—	—	—
Other	139 (332)	24,905	9,353	8,418	36	42,712	46,957
Unknown	253 (330)	21,283	9,226	6,720	114	37,342	41,303
Not reported	88 (329)	16,956	10,623	7,137	221	34,937	38,760

¹Expenditures were calculated only for persons who had at least one full year of Medicare entitlement prior to the observation year. Thus, any patients for whom Medicare was a secondary payer were not included.

²Average number of days of Medicare coverage shown in parentheses.

NOTE: Rates based on fewer than 30 observations are not displayed.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Program Management and Medical Information System, and the Medicare Automated Data Retrieval System, April 1992 update.

Providers of renal care

This section discusses the growth in the number of participating renal providers furnishing some form of service to end stage renal disease (ESRD) patients. For the purpose of this report, the following definitions apply. "Dialysis facility" refers to all providers approved by Medicare to furnish at least one type of dialysis service. A "dialysis center" is a hospital-based unit which, in addition to providing dialysis service(s), is also approved to furnish the full spectrum of diagnostic, therapeutic, and rehabilitative services. The term "transplant center" includes all hospitals approved to do kidney transplants. The term "renal provider" encompasses all of the units described above. Please note that the number of Medicare renal facilities reported in Tables 54, 55, and 56 does not equal the total number of surveyed Medicare renal providers reported in Tables 20 through 35. A complete explanation of this difference may be found on page 22 of this report.

Growth in numbers and types of renal providers

Since the Medicare ESRD program began in 1973, the total number of Medicare-approved renal providers has more than tripled from 606 in 1973 (not shown) to 2,202 in December 1991 (Table 54). However, since 1987, the increase in total numbers of renal providers has remained relatively constant at about 6.5 percent annually. Rates of increase calculated from the data in Table 55 show that the increase in 1991 was 6.3 percent; in 1990 was 6.9 percent; and in 1989 was 6.5 percent.

The specific increase in the number of dialysis facilities has been primarily among freestanding facilities; i.e., facilities not affiliated with hospitals. In 1973 there were only about 68 freestanding facilities (not shown), which represented about 11 percent of the total number of Medicare-approved dialysis facilities in operation at that time. At the end of 1991, there were 1,376 freestanding dialysis facilities, which represented about 62.5 percent of the total. The rates of increase for

freestanding dialysis facilities, calculated from the data in Table 55, show that the increase in 1991 was only 7.4 percent compared to 10.1 percent in 1990; 9.2 percent in 1989; and 11.0 percent in 1988.

Table 55 shows that, in 1988, renal providers were split almost evenly between proprietary and nonprofit (49.9 and 50.1 percent, respectively). By 1991, the proprietary organizations accounted for 8.2 percent more providers than the nonprofit organizations (54.1 and 45.9 percent, respectively). The clear trend is that, while the number of providers in both groups is increasing each year, the number of proprietary organizations is increasing at a faster rate. In 1990, the number of proprietary renal providers increased 10.4 percent over 1989, but the number of nonprofit organizations increased only 3.2 percent for the same period. From 1990 to 1991 these figures were 8.0 percent and 4.3 percent, respectively.

Type of renal care provided

In 1991, 10,026 renal transplants were reported in Medicare-approved transplant centers (see Table 29). ESRD patients who do not receive kidney transplants receive dialysis care either at home or at one of the 2,084 dialysis facilities. These facilities may be in either a hospital setting (of which there were 207 dialysis facilities and 501 dialysis centers at the end of 1991) or a non-hospital setting (of which there were 1,376 at the end of 1991). As stated in the footnote to Table 56, the categories will not add across to the total because some renal providers have both a transplant center and a dialysis facility. In fact, at the end of 1991, 168 of the 501 dialysis centers noted above were in hospitals that also had approved transplant centers. Finally, 58 other dialysis centers are defined as inpatient centers because they provide backup dialysis services only, and 20 percent or less of their dialysis service is provided on an outpatient basis. (These 58 centers are not included in the 2,084 outpatient dialysis providers described above.)

Table 54

Medicare-approved end stage renal disease providers of service by type of service and number of approved dialysis stations: 1982-91

Year	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Total providers	1,218	1,308	1,368	1,463	1,578	1,701	1,819	1,938	2,072	2,202
Transplant hospitals										
Transplant center only	8	13	25	31	34	39	41	53	53	60
Transplant/dialysis centers	149	146	145	147	149	160	161	165	169	168
Other hospitals/satellites										
Inpatient care only	39	49	53	52	45	42	44	55	51	58
Dialysis centers	380	363	360	359	353	351	349	332	332	333
Dialysis facilities	113	111	117	126	136	149	158	169	186	207
Non-hospitals										
Dialysis facilities	529	626	668	748	861	960	1,066	1,164	1,281	1,376
Total approved										
Outpatient stations	14,438	15,506	16,594	17,845	19,383	21,246	22,605	23,654	25,052	28,812

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Program Management and Medical Information System, 1982-91.

Table 55

Number and percent of Medicare-approved end stage renal disease providers, by type of ownership: 1987-91

Type of ownership	1987		1988		1989		1990		1991	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Total	1,701	100.0	1,819	100.0	1,938	100.0	2,072	100.0	2,202	100.0
Proprietary	805	47.3	907	49.9	999	51.5	1,103	53.2	1,191	54.1
Hospital-based	24	1.4	26	1.4	28	1.4	28	1.3	32	1.5
Freestanding	781	45.9	881	48.4	971	50.1	1,075	51.9	1,159	52.6
Nonprofit	896	52.7	912	50.1	939	48.5	969	46.8	1,011	45.9
Hospital-based	717	42.2	727	40.0	746	38.5	763	36.9	794	36.1
Freestanding	179	10.5	185	10.2	193	10.0	206	9.9	217	9.9

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Program Management and Medical Information System, 1987-91.

Table 56
Medicare-approved end stage renal disease providers of service,
and number of approved dialysis stations, by State: December 1991

State	Total providers of service ¹	Hospital transplant centers	Outpatient dialysis facilities			Inpatient hospital dialysis centers	Approved dialysis stations total	Facilities training in self-dialysis
			Total	Hospital	Independent			
Total	2,202	228	2,084	708	1,376	58	28,812	1,271
Alabama	43	2	42	3	39	1	595	24
Alaska	2	0	2	0	2	0	25	1
Arizona	44	5	41	8	33	1	483	27
Arkansas	36	3	35	10	25	1	419	21
California	243	23	227	40	187	4	3,166	148
Colorado	21	4	19	5	14	0	271	14
Connecticut	20	2	20	15	5	0	240	17
Delaware	7	0	6	1	5	1	106	4
District of Columbia	21	5	21	8	13	0	260	11
Florida	150	7	144	20	124	6	2,160	78
Georgia	85	5	83	16	67	0	1,268	40
Hawaii	12	1	12	7	5	0	138	2
Idaho	7	0	7	6	1	0	57	3
Illinois	94	8	87	37	50	7	1,254	55
Indiana	39	2	38	19	19	1	519	26
Iowa	15	3	14	11	3	0	171	12
Kansas	19	2	17	1	16	1	236	7
Kentucky	27	3	25	6	19	0	288	16
Louisiana	72	7	67	7	60	1	880	33
Maine	6	1	6	4	2	0	65	5
Maryland	52	3	50	11	39	2	836	40
Massachusetts	39	10	38	19	19	0	449	29
Michigan	54	10	52	32	20	1	701	36
Minnesota	33	4	32	26	6	0	318	7
Mississippi	33	1	33	4	29	0	514	9
Missouri	54	9	49	21	28	3	608	32
Montana	7	0	7	6	1	0	59	5
Nebraska	16	3	11	9	2	4	111	8
Nevada	6	2	5	2	3	0	74	4
New Hampshire	6	0	6	2	4	0	54	6
New Jersey	37	3	37	27	10	0	629	24
New Mexico	19	2	17	8	9	0	159	11
New York	120	15	120	84	36	0	1,604	80
North Carolina	64	5	64	10	54	0	964	30
North Dakota	9	3	8	8	0	0	61	5
Ohio	53	12	53	34	19	0	713	35
Oklahoma	34	6	33	19	14	0	367	13
Oregon	16	1	16	11	5	0	171	12
Pennsylvania	118	11	100	33	67	17	1,532	89
Puerto Rico	21	1	18	5	13	3	348	12
Rhode Island	6	0	6	2	4	0	100	5
South Carolina	46	1	45	1	44	1	689	8
South Dakota	8	0	8	8	0	0	52	2
Tennessee	65	8	58	3	55	0	875	20
Texas	152	17	140	22	118	2	2,458	93
Utah	17	2	16	8	8	0	139	9
Vermont	2	1	2	2	0	0	19	1
Virgin Islands	1	1	1	1	0	0	8	0
Virginia	72	4	71	21	50	0	822	49
Washington	24	5	21	10	11	0	247	12
West Virginia	15	2	15	7	8	0	156	11
Wisconsin	35	3	34	26	8	1	331	29
Wyoming	2	0	2	0	2	0	17	1
American Samoa	1	0	1	1	0	0	9	0
Guam	1	0	1	1	0	0	12	0
Mariana Islands	1	0	1	0	1	0	5	0

¹Categories do not add across to total because some hospital transplant centers also provide outpatient services and are counted again in that category.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Program Management and Medical Information System, December 1991.

End stage renal disease studies

Centers for Disease Control survey

The Centers for Disease Control (CDC) annually surveys dialysis facilities using their Form 53.7, "National Surveillance of Dialysis-Associated Diseases." The CDC form is mailed by the Health Care Financing Administration to Medicare dialysis facilities along with the HCFA-2744, End Stage Renal Disease Facility Survey. As CDC surveys are received, they are forwarded to CDC for appropriate analyses.

Following is an explanation of the contents of the report entitled, "National Surveillance of Dialysis-Associated Diseases in the United States, 1991."

National Surveillance of Dialysis-Associated Diseases in the United States, 1991

by Jerome I. Tokars, M.D., M.P.H., Miriam J. Alter, Ph.D.
and Martin S. Favero, Ph.D.

In conjunction with the annual facility survey performed by the Health Care Financing Administration (HCFA) for calendar year 1991, the Centers for Disease Control (CDC) distributed by mail a questionnaire to all 2,123 chronic hemodialysis centers approved by HCFA. Information was collected on:

- The use of specific hemodialysis practices (e.g., high flux dialysis, bicarbonate dialysate, and reuse of disposable equipment).
- The incidence and prevalence of hepatitis B virus (HBV) infection, the prevalence of antibody to hepatitis B surface antigen (anti-HBs), the use of hepatitis B vaccine, and the incidence of non-A non-B hepatitis, in patients and staff.
- The occurrence of other hemodialysis-associated complications and diseases (e.g., pyrogenic reactions, new dialyzer syndrome).
- The number of patients with human immunodeficiency virus (HIV) infection and policies for testing of patients for HIV.

The reported incidence and prevalence of (HBV) infection among patients and staff was measured by using hepatitis B surface antigen (HBsAg) and anti-HBs as markers. Incidence was defined as the percentage of all patients or staff present in the facility for at least 1 month in 1991 who became positive for HBsAg during 1991. Prevalence was defined as the percentage of all patients or staff present in the facility during the first week of December 1991 who were positive for HBsAg or for anti-HBs.

Data were analyzed with the chi square or Fisher's exact test for differences in proportions. When adjustment for confounding variables was required, the Mantel-Haenszel test or stepwise logistic regression was

used. A P-value of less than 0.05 was considered significant.

Questionnaires were returned by 2,046 centers, a response rate of 96 percent. These centers represented 155,877 patients and 40,298 staff members. Approximately 350 facilities were recontacted for clarification of data. The percentage of centers that reported reuse of disposable dialyzers continued to increase and in 1991, 71 percent of the centers reported that they reused disposable dialyzers. Ninety-one percent of centers used bicarbonate as their primary method of dialysis in 1991 (compared with 22 percent in 1986) and 31 percent of centers reported treating patients with high flux dialysis. The reported incidence of HBV infection was 0.2 percent among patient and 0.04 percent among staff members. Receipt of three doses of hepatitis B vaccine was reported for 17 percent of patients and 56 percent of staff members. Pyrogenic reactions in the absence of septicemia were reported by 20 percent of centers. HIV infection was reported in 1.2 percent of patients, and AIDS in 0.6 percent of patients.

Please refer any questions or requests for this report to: Investigation and Prevention Branch (Hospital Infections Program) or Hepatitis Branch (Division of Viral Diseases), National Center for Infectious Diseases, Centers for Disease Control, Atlanta, Georgia 30333.

Health Care Financing Administration grant activity summaries

The Health Care Financing Administration is presently involved in many research activities that deal with or touch on the end stage renal disease program. These activities range from internal HCFA reviews to full-scope extramural studies that are covered under the grant or cooperative agreement process.

Summaries of these activities follow.

End Stage Renal Disease Nutritional Therapy Study

Period: September 1984-August 1994
Award: Interagency Agreement
Agency: National Institutes of Health
National Institute of Diabetes and
Digestive and Kidney Disease
Bethesda, MD 20892
Project Officer: Arne H. Anderson
Division of Health Systems and
Special Studies

Mandate: Omnibus Reconciliation Act of 1980
(Public Law 96-499)

Description: In accordance with the congressional mandate, this study, known as the Modification of Diet in Renal Disease Study, is a multicenter cooperative clinical study designed to ascertain whether restriction of dietary protein and phosphorus and/or reduction of blood pressure

well below the currently accepted target of 140/90 will reduce the rate of progression of chronic renal disease, regardless of the nature of the primary underlying process. The study is being conducted jointly by the National Institutes of Health (NIH) and the Health Care Financing Administration (HCFA).

Status: Phase I, the developmental phase, began in September 1984 and ended in December 1985. This phase produced a clinical protocol, forms manual, and operation manual. Phase II, a 2-year pilot study, began in January 1986 at nine clinical sites. Phase III, the full-scale clinical study, began in January 1989 at 15 clinical sites and is to run until December 31, 1992. At the conclusion of this phase, NIH will determine to what extent the dietary restrictions and blood pressure reduction result in a reduced rate of progression of chronic renal disease. HCFA is responsible for conducting the cost-effectiveness component of the study if the therapy is found to be effective. The following questions will be addressed in the cost analysis to be conducted by HCFA:

- Is nutritional therapy cost effective in the treatment of patients in the study?
- Is nutritional therapy less costly to HCFA than the current payment for dialysis and transplantation?
- Is payment for nutritional therapy under HCFA administratively feasible?
- Can the therapy be effectively managed?

Cost and Outcomes from Different End Stage Renal Disease Treatment Modalities

Project No.: 500-90-0050
Period: September 1990-December 1992
Funding: \$200,039
Award: Contract
Contractor : The Urban Institute
2100 M Street, NW., Suite 400
Washington, DC 20037
Project Officer: Joel W. Greer, Ph.D.
Division of Beneficiary Studies
Mandate: Omnibus Budget Reconciliation Act of 1986 (Public Law 99-509)

Description: The purpose of this project is to study the cost effectiveness of various treatment modalities for end stage renal disease (ESRD).

Status: Revisions to the draft final report have been received. The final report was completed December 1992. As expected, transplantation improves survival and is the most cost effective modality for all age, race and cause of ESRD groups. Transplantation is not necessarily cost-saving, however. It is cost effective since it has the lowest cost per day, but total costs are sometimes increased due to longer years of life. Center hemodialysis is more cost effective than CAPD as patient age increases. However, for the youngest age group, CAPD is associated

with longer survival. Home hemodialysis is generally not more cost effective than center hemodialysis due to higher costs. There are many qualifications which complicate the interpretation of these results.

Rates of Inpatient and Outpatient Shunt Procedures for End Stage Renal Disease Beneficiaries

Project No.: 99-C-98489/9
Period: August 1991-December 1992
Funding: \$103,906
Award: Cooperative Agreement
Awardee: The RAND Policy Research Center
Project Officer: Joel W. Greer, Ph.D.
Division of Beneficiary Studies

Description: The most frequent principal diagnosis for hospitalizations among end stage renal disease (ESRD) beneficiaries is Code 996 from the International Classification of Diseases, 9th Revision, Clinical Modification (ICD-9-CM): complications peculiar to certain specified procedures. For ESRD patients these hospitalizations are usually for insertion, repair or replacement of the vascular access device, the so-called shunt. It is believed that some of these hospitalizations could have been performed in an outpatient setting. The purpose of this study is to examine physician billings for shunt procedures for their dialysis patients and to examine cost differences between inpatient and outpatient settings. The project will involve analysis of inpatient, outpatient, and physician and supplier data files for ESRD beneficiaries. The project will:

- Identify physicians receiving monthly capitation payments (MCP).
- Analyze distribution of ESRD patients and Medicare reimbursements among physicians receiving MCP payments.
- Look at numbers and costs of shunt procedures performed by physicians. Examine place of service, distribution across physicians, and whether some physicians seem to use hospitals exclusively.
- Compare the costs to Medicare of inpatient versus outpatient shunt procedures.

Status: Descriptive statistics have been produced. The analysis is proceeding.

Review of the First Year of Medicare Coverage of Erythropoietin

Project No.: 500-90-0051
Period: September 1990-December 1992
Funding: \$401,099
Award: Contract
Contractor: The Johns Hopkins University
Program for Medical Technology and Practice Assessment
1830 East Monument Street, Room 8061
Baltimore, MD 21205

Project Officer: Joel W. Greer, Ph.D.
Division of Beneficiary Studies

Mandate: Omnibus Budget Reconciliation Act of 1986 (Public Law 99-509)

Description: The Health Care Financing Administration (HCFA) began covering human recombinant erythropoietin (EPO) in July 1989. Researchers have examined usage patterns, costs, outcomes, and cost effectiveness of EPO following its coverage by HCFA. Changes in morbidity as measured by hospitalizations are being analyzed.

Status: Many interesting findings have been produced. Four papers are under review by professional journals, one of which has been accepted for publication. At least one other paper is being prepared for submission. A final report summarizing the findings will be prepared.

Principal findings are that EPO was accepted rapidly by dialysis providers and patients. Dosing was well below amounts used in clinical trials and the resultant increases in hematocrit were below expectations. For profit and free standing dialysis facilities tended to provide EPO to a higher proportion of their patients, but to prescribe lower average doses.

Evaluation of Capitation Payment for End Stage Renal Disease (ESRD) Services

Project No.: 500-92-0023/03
Period: September 1992-September 1993
Funding: \$239,056
Award: Contract (Delivery Order in a Master Contract)

Contractor: The Rand Corporation
1700 Main Street
P.O. Box 2138
Santa Monica, CA 90407-2138

Project Coordinator: Paul Eggers
Division of Beneficiary Studies

Mandate: Social Security Act, Section 1875

Description: The purpose of this project is to develop options to capitating payments for services to ESRD patients and to perform a preliminary evaluation of the financial implications of at least one such payment system on the Medicare ESRD program and on the health plan serving ESRD patients. The work will address several considerations that are central to the design of a capitation payment system for ESRD services. These include incentives for appropriate service use, control of program costs, and patient and provider participation; selection of services to be included in the capitation; and methods to adjust capitation payments for financial risks.

Status: This project is in the early developmental stages.

Staff-Assisted Home Dialysis Demonstration

Project No.: 500-87-0030
Period: June 1991-December 1995
Funding: \$914,203
Award: Technical Support:
Evaluation of Demonstrations

Contractor: Abt Associates, Inc.
55 Wheeler Street
Cambridge, MA 02138-1168

Project Officer: Bonnie M. Edington
Division of Health Systems and
Special Studies

Mandate: Omnibus Budget Reconciliation Act of 1990 (Public Law 101-508)

Description: This demonstration is to test whether providing Medicare-paid home hemodialysis assistants for end stage renal disease (ESRD) patients meeting stringent eligibility criteria (e.g., bed- or wheelchair-bound) is cost effective, in that it reduces Medicare-covered ambulance costs for transporting patients to maintenance dialysis in facilities or reduces hospital admissions attributed to transportation-related problems. The legislation limits the experimental benefit to a maximum of 800 patients and stipulates a detailed rate setting formula.

Status: Letters of solicitation were sent to all dialysis facilities in January 1992. Facilities serving appropriate patients and willing to accept the payment rate refer patients to their local ESRD Network. Patients can be enrolled through April 1994. Patients meeting the eligibility criteria are randomized into the experimental or the control group. Experimental services began in May 1992. The contractor interviews participating patients soon after they are enrolled in the demonstration and 1 year later. The ESRD Networks collect medical record data on participating patients every 6 months. A Report to Congress was submitted on January 15, 1993. The next scheduled Report to Congress is due December 31, 1995.

Center Billings for Ancillary Dialysis Services

Project No.: 99-C-98489/9
Period: August 1991-December 1992
Funding: \$120,000
Award: Cooperative Agreement
Awardee: The RAND Policy Research Center
Project Officer: Joel W. Greer, Ph.D.
Division of Beneficiary Studies

Description: Medicare pays a fixed amount-called the composite rate-for each dialysis session including supplies, drugs, and tests. There are ancillary tasks that could be considered as part of the composite rate but may be billed separately at times. Researchers will compile a list of these ancillary services and examine the current quantity and costs of supplies, drugs, tests, and services provided to dialysis patients supplementary to those covered in the composite rate.

Status: The data have been installed on RAND's computers and descriptive statistics run. An analysis plan has been agreed upon by RAND and ORD. A final report has been prepared and will be available in the Spring of 1993.

The National Cooperative Transplantation Study

Project No.: 17-C-99183/0
Period: June 1988-February 1991
Funding: \$235,118
Award: Cooperative Agreement
Awardee: Battelle Human Affairs Research Centers
4000 NE. 41st Street
Seattle, WA 98105
Project: Lawrence E. Kucken
Officer: Division of Beneficiary Studies

Description: For this project, researchers examined the patient and organizational characteristics that determine successful kidney, heart, and other organ transplantation outcomes, the center effect. Using multivariate life-table methods, data from the Medicare program were combined with information from surveys of transplant facilities to construct a model of transplant facility effectiveness and to analyze other aspects of organ transplantation.

Status: The final report comprises a comprehensive analysis of organ transplantation in the United States including organ supply and demand, volume, costs, and other facets. Three transplant center experience-related variables were analyzed with respect to patient outcomes (survival rates). These included transplant program volume, physician experience, and surgeon experience. Some of the more salient findings pertaining to the center effect are:

- Each of these variables was found to exhibit a strong (favorable) statistical influence on patient outcomes for patients undergoing kidney transplantation.
- A much weaker relationship (ranging from none to modest) was found between these experience-related variables and outcomes for patients undergoing heart and liver transplantation.

The final report has been submitted to the National Technical Information Service (Accession No. PB 92-170182).

Impact of Complicating Diseases on ESRD Outcomes and Costs

Project No.: 17-C-90082/3-01
Period: February 1992-February 1994
Funding: \$321,044
Award: Cooperative Agreement
Awardee: The Johns Hopkins University
School of Medicine
720 Rutland Avenue
Baltimore, Maryland 21205
Project: Lawrence E. Kucken
Officer: Divisions of Beneficiary Studies
Mandate: Omnibus Budget Reconciliation Act of 1986 (Public Law 99-509)

Description: The purpose of this project is to examine patient and provider characteristics associated with complicating diseases within the End-Stage Renal Disease (ESRD) population, and the effects of these disease patterns on patient outcomes, utilization, and costs. The study design will involve longitudinal analyses of ESRD patients to determine risk factors associated with the onset of complicating illness and outcomes such as hospitalization and mortality. The study period covers the years 1984-1990 and will draw upon the ESRD Program Management and Medical Information System and other Medicare statistical files.

Status: This project is in the early developmental stage.

Appendix A

Glossary of terms

Access device - A piece of equipment or a mechanism designed to provide access to the patient's bloodstream (for hemodialysis) or to the peritoneal membrane (for peritoneal dialysis).

Agreement - A written document executed between an ESRD facility and another facility in which the other facility agrees to assume responsibility for furnishing specified services to patients and for obtaining reimbursement for those services.

Arrangement - A written document executed between an ESRD facility and another facility in which the other facility agrees to furnish specified services to patients but the ESRD facility retains responsibility for those services and for obtaining reimbursement for them.

Backup dialysis - A dialysis session furnished to an ESRD patient which is outside the patient's routine dialysis setting; e.g., a home patient dialyzing in the facility or an in-facility patient transferred to a backup facility.

Backup hospital - A hospital with which a dialysis facility has a written agreement under which inpatient hospital care or other hospital services are available promptly to the dialysis facility's patients when needed.

Cadaveric transplant - The surgical procedure of excising a kidney from a cadaver and implanting it into the patient.

Centers by number of transplants - Centers performing a specified number of transplants for the survey period.

Chronic maintenance dialysis - Dialysis regularly furnished to an ESRD patient in either a hospital-based, independent (non-hospital based), or home setting.

Continuous ambulatory peritoneal dialysis (CAPD) - A type of peritoneal dialysis in which the patient dialyzes at home, using special supplies, but without the need for a dialysis machine.

Continuous cycling peritoneal dialysis (CCPD) - A variant of CAPD in which a machine is used at home to make exchanges at night automatically.

Dialysis - A process of maintaining the chemical balance of the blood when the kidneys have failed; specifically, a process by which dissolved substances are removed from the patient's body by diffusion from one fluid compartment to another across a semi-permeable membrane. The types of dialysis currently used are hemodialysis, intermittent peritoneal dialysis (IPD), continuous ambulatory peritoneal dialysis (CAPD), and continuous cycling peritoneal dialysis (CCPD).

Dialysis center - A hospital unit which is approved to furnish the full spectrum of diagnostic, therapeutic, and rehabilitative services required for the care of ESRD dialysis patients (including inpatient dialysis but excluding transplantation). Services may be furnished directly or under arrangement with another approved provider.

Dialysis facility - A unit (hospital-based or freestanding) which is approved to furnish dialysis service(s) directly to ESRD patients.

Dialysis station - The treatment area which is designed and equipped to provide adequate and safe dialysis therapy, as well as privacy and comfort for patients.

Dialysis treatment - One session of dialysis, either in a dialysis facility or at home.

Dialysis treatments given (other than home) - The times dialysis machines were used in a dialysis facility to provide patient treatments.

Disposition of cadaveric kidneys - The final disposition of acquired cadaveric kidneys (e.g., transplanted, used for research, or discarded).

End stage renal disease (ESRD) - That stage of renal impairment which is irreversible and permanent and requires dialysis or kidney transplantation to ameliorate uremic symptoms and maintain life.

ESRD facility - See dialysis facility.

ESRD network - An approved organized group of ESRD providers in a designated area which, by their type and location and because of local referral patterns, collectively furnish the necessary care for ESRD patients in the population served.

ESRD patient - A person with irreversible and permanent kidney failure.

ESRD service - Treatment or care (e.g., dialysis, transplantation, supplies) usually rendered to those diagnosed as having ESRD.

Facilities/centers surveyed - Individual facilities/centers completing the annual ESRD Facility Survey form.

Hemodialysis - A method of dialysis in which blood from a patient's body is circulated through an external device or machine and returned to the patient's bloodstream. Such an artificial kidney machine usually is designed to remove fluids and metabolic end products from the blood stream by placing the blood in contact with a semi-permeable membrane which is bathed on the

other side by an appropriate chemical solution referred to as dialysate.

Home patients - Those patients who maintain their own dialysis equipment and/or supplies at home and perform their own treatment alone or with assistance of a helper.

Inpatient care only - A renal dialysis center which performs backup services for dialysis facilities and performs 20 percent or less of its dialysis on an outpatient basis.

Inpatient dialysis - Dialysis which, because of medical necessity, is furnished to an ESRD patient on a temporary inpatient basis in a hospital.

Intermittent peritoneal dialysis (IPD) - A procedure that introduces dialysate into the abdominal cavity to remove waste products through the peritoneum (a membrane which surrounds the intestines and other organs in the abdominal cavity). It functions in a manner similar to that of the artificial semi-permeable membrane in the hemodialysis machine.

In-unit (in-facility) patients - Those patients whose self-dialysis or staff-assisted dialysis is performed in a dialysis unit or facility.

Living-related donor transplant - The surgical procedure of excising a kidney from a living relative of the patient and implanting it in the patient.

Living-unrelated donor transplant - The surgical procedure of excising a kidney from a living person not related to the patient and implanting it in the patient.

Lost to followup (LTFU) - A category of patients whose current status is unknown to the facility which at one time had been dialyzing/following the patient.

Medicare ESRD beneficiary - A person qualifying for Medicare by means of the renal disease provision of the law.

Non-viable kidneys - Cadaver kidneys that are not suitable for transplantation (may be used for research or discarded).

Organ procurement - The process of acquiring donor kidneys.

Organ Procurement Agency (OPA) - An organization which performs or coordinates the performance of all the following services: harvesting of donated kidneys; preservation of donated kidneys; transportation of donated kidneys; and maintenance of a system to locate prospective recipients for harvested organs.

Outpatient dialysis - Dialysis furnished on an outpatient basis at a renal dialysis center or facility. Outpatient dialysis includes staff-assisted dialysis and self-dialysis.

Patients awaiting transplant - Patients who are medically able to receive a transplant, have given consent for a transplant, and are on an active transplant list.

Peritoneal dialysis - See intermittent peritoneal dialysis.

Program Management and Medical Information System (PMMIS) - A computer-based system containing medical and demographic data that deals primarily with current Medicare-eligible ESRD patients but also maintains historical information on persons no longer classified as ESRD patients by reason of death or successful transplantation. In addition, it contains information on ESRD facilities and facility reimbursement.

Provider number - A six-digit number assigned by HCFA for the purposes of identification and billing.

Receiving service - Patients who receive either kidney dialysis or kidney transplant services.

Renal dialysis center - See dialysis center.

Renal dialysis facility - See dialysis facility.

Renal network - See ESRD network.

Renal transplant center - A hospital unit which is approved to furnish transplantation and other medical and surgical specialty services for the care of ESRD transplant patients, including inpatient dialysis furnished directly or under arrangement.

Restarted dialysis - A category of ESRD patients who were on chronic maintenance dialysis, left that treatment category for reasons other than a transplant (e.g., recovered kidney function), then returned to dialysis.

Self-care services - Services provided by a dialysis facility or center to patients who have been trained to perform self-dialysis.

Self-dialysis - Dialysis performed with little or no professional assistance by an ESRD patient who has completed an appropriate course of training.

Self-dialysis patients - Patients who have been trained in dialysis techniques and dialyze themselves in a dialysis facility or at home with little or no professional assistance.

Self-dialysis training and home training - Programs that train ESRD patients to perform self-dialysis in a dialysis facility or at home with little or no professional assistance and train other individuals to assist patients in performing self-dialysis or home dialysis.

Special purpose facility - A renal facility which is approved to furnish dialysis at special locations on a short-term basis to a group of dialysis patients otherwise

unable to obtain treatment in the geographical area. The special locations must be either special rehabilitative (including vacation) locations servicing ESRD patients temporarily residing there, or locations in need of ESRD facilities under emergency circumstances.

Staff-assisted dialysis - Dialysis performed by the staff of the renal dialysis center or facility.

Started for first time ever - A category of ESRD patients who have been newly diagnosed as having ESRD and have been stabilized on dialysis. During the survey period, these patients began their initial course of staff-assisted chronic maintenance dialysis or completed a course of self-dialysis training and began dialyzing at home or self-dialyzing at a facility.

Survey period - The period January 1 through December 31 of each year for which all ESRD facilities must complete a HCFA-2744, ESRD Facility Survey.

Training services - See self-dialysis training and home training.

Transient patients - Patients who are treated by facilities episodically (less than 51 percent of the survey period); e.g., vacationers.

Transplant - The surgical procedure that involves excising an organ from either a cadaver or a living donor and implanting it in the patient.

Transplant center - See renal transplant center.

Transplants performed - The number of kidneys transplanted by donor source type; i.e., living-related, living-unrelated, or cadaveric.

Treatment setting - The type and location of the dialysis treatment being performed; i.e., self-dialysis (in-unit or home), self-dialysis training, or staff-assisted dialysis.

Appendix B

Entitlement provisions

The 1972 Amendments to the Social Security Act extended Medicare coverage to individuals with end stage renal disease beginning July 1973, the month the law became effective. End stage renal disease is that stage of kidney impairment which is irreversible, cannot be controlled by conservative management alone, and requires dialysis or kidney transplantation to maintain life.

As soon as an individual knows that he needs maintenance dialysis treatments, he should apply for Medicare at any social security office. Social Security representatives will help the applicant furnish all necessary information and answer questions he may have about the Medicare program. One of the essential forms to be completed will be a HCFA-2728, Chronic Renal Disease Medical Evidence Report. Notification of entitlement will be mailed later. If a person cannot come to the Social Security office, arrangements can be made so that a representative can visit the person to take an application.

When entitlement to hospital insurance (Part A) is established, the individual is automatically enrolled for supplementary medical insurance (Part B) to begin the same month, unless he specifies he does not want this coverage.

It is not in the best interest of most persons with end stage renal disease to decline Part B coverage because many renal services, such as outpatient dialysis treatments, are covered only under Part B. A person qualifying for Medicare by means of the renal disease provision is eligible for the full range of benefits available under the health insurance program, not just for those services relating to renal care.

Nature of 1978 amendments

The 1978 Amendments to the Social Security Act made a number of changes in the rules governing entitlement to Medicare based on end stage renal disease. The changes were designed to encourage self-dialysis and transplantation and to eliminate a number of inequities and difficulties that existed under previous law. The following changes became effective October 1, 1978:

- *Age 65 restriction removed*—Prior to October 1, 1978, persons 65 years of age or over were ineligible for Medicare based on end stage renal disease. This restriction has been eliminated.
- *Application requirement*—On claims for entitlement October 1, 1978 and later, an application must be filed, with retroactivity limited to no more than 12 months before the month of filing.
- *Early entitlement based on hospitalization for transplant surgery*—Entitlement may begin during a month in the qualifying period if, during that period, the individual is hospitalized for transplant procedures, and the transplant takes place no later than 2 months thereafter.

- *Waiver of qualifying period based on self-dialysis training*—The qualifying period is waived for persons who during the qualifying period participate in self-dialysis training and are expected to complete the training successfully and self-dialyze thereafter.
- *36 months of post-transplant entitlement*—Entitlement terminates 36 months (rather than 12 months, as under previous law) after the month in which an individual undergoes kidney transplantation.
- *No second qualifying period after termination of R-HI (health insurance based on entitlement because of renal provision of the law)*—An individual whose entitlement to Medicare on the basis of ESRD has ended will be re-entitled as of the month his new course of dialysis begins, subject to the filing of a timely application.

Requirements for eligibility

To qualify for Medicare under the renal provision, a person must have end stage renal disease and either: be entitled to a monthly insurance benefit under title II of the Social Security Act (or an annuity under the Railroad Retirement Act); or be fully or currently insured under Social Security (railroad work may count); or be the spouse or dependent child of a person who meets at least one of these last two requirements. There is no minimum age for eligibility under the renal disease provision. An application for Medicare must be filed (effective October 1, 1978).

When entitlement begins

Provided all eligibility requirements are met, a person's Medicare entitlement based on the renal provision of the law begins with one of four occurrences.

- The third month after the month in which a course of dialysis is initiated. For example, if a course was initiated any time during the month of January, the date of entitlement would be April 1 (Table B-1).
- If earlier, the month a course of maintenance dialysis begins if the individual participates within the waiting period in a self-dialysis training program in an approved facility and is expected to complete the training successfully and self-dialyze thereafter (effective October 1, 1978).
- If earlier, the month of transplant.
- If earlier, the month an individual is admitted to an approved hospital for procedures preliminary to a transplant, if the transplant takes place within the following 2 months. If the transplant is delayed more than 2 months, Medicare coverage will begin the second month prior to the month the actual transplant takes place, or, if earlier, the first day of the third month after maintenance dialysis began (effective October 1, 1978).

Table B-1**Effective date chart for patients applying for
end stage renal disease benefits**

Regular course of dialysis initiated	Date of entitlement
January	April 1
February	May 1
March	June 1
April	July 1
May	August 1
June	September 1
July	October 1
August	November 1
September	December 1
October	January 1
November	February 1
December	March 1

When entitlement ends

A person's entitlement to this provision terminates with the earliest of the following events:

- The day of death; or
- The last day of the 12th month after a person no longer requires maintenance dialysis treatments; or
- The last day of the 36th month after the month in which the individual receives a kidney transplant. If within 36 months after transplantation the person requires another transplant or returns to dialysis, there is no interruption in entitlement (effective October 1, 1978).

Appendix C

End stage renal disease data sources

Form title and number	Primary purpose	PMMIS function	Research potential
International Provider Billing (HCFA-1450)	Billing	Dialysis incidence Inpatient stay diagnosis	Prevalence and outcome analyses, morbidity.
ESRD Transplant Information (HCFA-2745-U4)	Clinical information	Transplant incidence	Clinical research: Efficacy of treatment, prevalence, and outcome analyses.
ESRD Transplant Follow-up (no number)	Clinical rehabilitative information	Patient and graft survival and rehabilitation	Clinical research: Efficacy of treatment and outcome analysis.
ESRD Death Notification (HCFA-2746)	Death incidence	Death incidence, cause of death	Outcome analyses.
CRD Medical Evidence Report (HCFA-2728-U4)	Entitlement	Identification of primary disease and first date of treatment	Incidence and outcome analyses.
ESRD Facility Survey (HCFA-2744)	Number of Medicare and non-Medicare patients by modality	National overview of Medicare and non-Medicare patients by modality	Incidence, prevalence, and outcome analyses.
ESRD Beneficiary Selection (HCFA-382-U4)	Billing	Home dialysis	Prevalence and outcome analyses.

NOTES: PMMIS is Program Management and Medical Information System. HCFA is Health Care Financing Administration. CRD is chronic renal disease. UB is uniform bill.

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